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STRAITS BRANCH
ROYAL ASIATIC SOCIETY

[No. 35]

JOURNAL

January 1901

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[No. 35]

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of the

Straits Branch

of the

Royal Asiatic Society

JANUARY 1901

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THE
STRAITS BRANCH
OF THE
ROYAL ASIATIC SOCIETY.

COUNCIL FOR 1901.

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Mr. A. Knight, *Vice-President for Singapore.*
The Hon'ble C. W. Kynnersley, *Vice-President for Penang.*
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Kehding, Dr.	Germany; c/o Menke & Co.
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Rankin, H. F.	Amoy.
Ridley, H. N.	Botanic Gardens, Singapore.
Roberts, B. G.	North Raub, Pahang.
Rodger, J. P., C. M. G.	Kwala Lumpor, Selangor.
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Rowland, W. R.	Negri Sembilan.
Sarawak, H.H. The R.C.S. of, ‡	Sarawak.
Sarawak, H. H. The Rajah of, G. C. M. G. †	Kuching, Sarawak.
Satow, Sir, E. M., K. C. M. G. †	Pekin.
Saunders, C. J.	Singapore.

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Seah Song Seah	Chop "Chin Hin," Singapore.
Shelford, R.	Sarawak.
Shelford, W. H.	Singapore.
Shellabear, Rev. W. G.	Singapore.
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St. Clair, W. G.	Singapore.
Stringer, Hon. Charles	England.
Sugars, J. C.	Telok Anson, Perak.
Swettenham, His Hon. Sir, J. A., K.C.M.G.	Singapore.
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Van Benningen von Helsdingen, Dr. R.	Tandjong Pandan, Billiton.
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Walter, W. G. C.	Klang.
Watkins, A. J. W.	Selangor Govt. Railway, Kuala Lumpor.
Wellford, Dr. F. ‡	Riverside Estate, Kuala Se-langor, Selangor.
West, Rev. B. Franklin	149 Anson Road, Penang.
Wickett, Frederick, M. J., C.E.,	Surukai Mine, Lahat, Perak.
Wise, D. H.	Pekan Pahang.
Wood, C. G.	Batu Gajah, Perak.
Wood, J. B. ‡	
Wray, L., Jr. ‡	Taipeng, Perak.

Members are requested to inform the Secretary of any change of address or decease of members, in order that the list may be as complete as possible.

All communications concerning the publications of the Society should be addressed to the Secretary: all subscriptions to the Treasurer.

Members may have, on application, forms authorising their Bankers or Agents to pay their subscriptions to the Society regularly each year.

PROCEEDINGS

of the

Annual General Meeting

The Straits Branch of the Royal Asiatic Society met at the Raffles Museum, Singapore, on 18th January, 1901.

Present:—Right Reverend Bishop Hose, Messrs. R. W. Hullett, W. G. St. Clair, E. Rostados, Hon'ble W. R. Collyer, W. Nanson, Hon'ble W. J. Napier, A. Knight, Hon'ble W. Egerton, Rev. W. G. Shellabear, Dr. Hanitsch, H. N. Ridley.

The Minutes of the last Annnal General Meeting were read and confirmed.

The Members elected by the Council during the year were confirmed in their election.

The Council's report was read and adopted on the motion of Hon'ble W. J. Napier, seconded by W. G. St. Clair.

The accounts presented by the Treasurer were adopted subject to audit proposed by Mr. Egerton seconded by Mr. Napier, Mr. A. Knight was asked to audit the accounts.

The Council and Officers were then elected, viz.:

President: Right Reverend Bishop Hose; proposed by Hon. W. R. Collyer, seconded by Hon. W. Egerton.

Vice President for Singapore: Mr. A. Knight; proposed by Mr. Collyer, seconded by Mr. Napier.

Vice President for Penang: Hon. C. W. KYNNERSLEY; proposed by Mr. Egerton, seconded by Mr. Knight.

Hon. Secretary: Mr. P. J. BURGESS; proposed by Mr. Ridley, seconded by Mr. Napier.

Hon. Treasurer: Dr. HANITSCH; proposed by Mr. Nanson, seconded by Mr. Collyer.

Councillors elected by ballot were:—Rev. W. G. Shellabear, W. G. St. Clair, A. W. S. O'Sullivan, W. Nanson, and E. Rostados.

A vote of thanks to the Chairman was proposed by Honorable W. R. Collyer and carried by acclamation.

Annual Report of the Council for 1900.

The Council are pleased to be able to state that the Finances of the Society are in a very satisfactory condition and that there has been a larger number of members added to the society than on the previous year. The members added were :—

Mr. C. Boden Kloss.
Mr. B. H. F. Barnard.
Mr. H. Norman.
Mr. G. B. Cerruti.
Dr. B. F. West.
Mr. R. von Pustau
Mr. J. Campbell-Ker.
Mr. H. F. Rankin.
Mr. P. J. Burgess.
Mr. W. G. C. Walter.
Hon. Datoh Bintara Luar.
Mr. J. E. Bishop.

The Council regret to have to record the death of a Member, Mr. H. S. Haynes, and feel that they could not pass over in silence the death of Dr. N. B. Dennys, who was one of the original members of the Society when it was founded in 1878. He was a councillor of the Society for many years, and also secretary, contributing many articles to its journal. He resigned his membership on going to Borneo.

Two Journals No. 33 and 34 were published during the year, and another is now being printed off and would have been in the hands of the members, but for the difficulty of procuring sufficient material, the number of contributors to the Journal being very small in proportion to the size of the Society.

The sale of the Map of the Peninsula was very satisfactory.

On the suggestion of a member, corresponding members for the various Native States were instituted to collect notes and correspondence for the Journal and to obtain new members. It was found difficult however to get corresponding members for all the Native States, but Dr. Luering kindly consented to act for Perak and Mr. A. L. Butler for Selangor.

A large number of books, pamphlets and periodicals were received from kindred societies in exchange for copies of our own Journal, and were added to the Library.

Honorary Treasurer's Cash Account, for the year ending 31st December, 1900.

Dr.		$	c.	*Cr.*		$	c.
1900	To Balance in Chartered Bank	309	01	1900	By American Mission Press for printing of Journal No. 33.	542	00
	,, Do. Mercantile Bank	514	88		,, do. No. 34	233	50
	,, Fixed Deposit, Mercantile Bank	1000	00		,, James Green, Plates I and II of Journal 34 ...	133	67
	,, Subscriptions for 1898	5	00		,, Jones and Evans, Plates III and IV of Journal 34	52	85
	,, do. ,, 1899	55	00		,, Binding Books, Mounting Maps, &c.	72	40
	,, do. ,, 1900	400	00		,, Commission to Collector	10	00
	,, do. ,, 1901	10	00		,, Clerk's Salary	60	00
	,, Sale of Journals	50	00		,, Petties and Postage ...	67	32
	,, Sale of Maps	768	61		,, Fixed Deposit, Mercantile Bank	1035	30
	,, Interest on Bank Balances	48	64		,, Balance in Chartered Bank	59	01
					,, Balance in Mercantile Bank	895	09
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R. HANITSCH,
Honorary Treasurer, Straits Branch, Royal Asiatic Society.

Audited and found correct.
A. KNIGHT.

The Flora of Mount Ophir.

BY H. N. RIDLEY.

The isolated group of hills commonly known as Mount Ophir has been visited and explored by a number of naturalists and others, and general accounts of its position, itinerary, etc. have been published from time to time, but no account of its botany has yet been given and it may therefore be of interest especially to those who may be intending to make the ascent to give an account of the more interesting plants to be found there, and in particular those from the uppermost peaks of the mountain.

The Mount Ophir early attracted the notice of the first naturalist in this country, on account of its isolated position and of its being the only high mountain accessible with safety in the early days. Griffith was the first botanist to make a really extensive collection of the plants there. He visited the mountain in 1845, ascending not only to the top of the main peak, but also to a certain height at least on the lower, seldom visited peak, Gunong Mering. A rough-field list of the plants he noticed is published in the Notulæ. He only lived a year in Malacca dying there the same year he visited Mt. Ophir.

Cuming, the orchid-collector, who also made extensive collections in the Philippines, and Lobb plant-collector for Veitch also visited Mt. Ophir, but devoted themselves more to cultural plants such as orchids than to less showy plants, and though they both brought down a number of dried specimens as well, no account of their collections nor indeed of their expeditions was, it appears, ever published.

Wallace (1854) marched across to Mt. Ophir from Malacca via Ayer Panas and remained a week there, collecting birds and insects. His letters, notes, and a paper written for the Royal Geographical Society were unfortunately all lost; (the Malay Archipelago Chap. III). Maingay made a very extensive collection of plants in Malacca and did not neglect Ophir. He added a considerable number of species to its flora as then known, but left no account of them, though they were described in the Flora of British India by Hooker and others. Mr. Hullett later made a small collection here which contained a number of important additions and novelties. His collection is preserved in the Herbarium of the Botanic gardens, Singapore where are also plants collected by R. Derry, and the spoils obtained by myself in two expeditions to this locality.

With all these collections made in so limited a district we may be certain that we have secured at least the greater part of the flora of the uppermost part of the range. The lower woods will still repay the researches of the botanist, but as the flora for the lower thousand or two thousand feet differs but little from that of similar altitudes in other parts of the peninsula, I intend to devote this paper to the characteristic upper flora of from 3,000 to 4,000 feet altitude, only referring to a few of the rarer plants met with at lower levels.

In the flora of British India where plants are referred to as having been collected on Mt. Ophir by Griffith, Maingay and others it frequently happens that the specimens were really obtained quite low down at the foot of the hills, or even some cases, in the plains and not really probably on Ophir at all, I have excluded these plants, they being evidently lowland kinds.

The usual way to arrive at the camping ground at Padang Batu is to start from Chabau and march across the lowland country to the foot of Bukit Besar, where the ascent commences. This district is now for the most part under cultivation or has formerly been so and what remains of the indigenous flora reresembles that of other parts of Malacca. But I may note that at Rellau formerly grew two interesting plants in some pastureland which I fear is now under tapioca-cultivation, namely the pretty ground orchid *Geodorum purpureum R.Br.* with its nodding head of pink flowers, and *Knoxia Corymbosaa*, Rubiaceous herb with heads of pale pink flowers which though of wide distribution is not by any means common in the peninsula. Arrived at the foot of Bukit Besar the path ascends somewhat steeply at first, to about 2,000 feet altitude, then after a short steep descent rises steeply to the Padang Batu. The whole of Bukit Besar is densely wooded, and contains many interesting plants. On a recent visit I rediscovered here the rare and curious saprophytic orchid *Leucolena ornata* Ridl, previously only known from Bukit Sadanen, and also the scarce fern *Pteris Dalhousiæ.* The flora here is that of the higher Malacca hills. *Dipterocarpeæ* and oaks (*Quercus Rassa*) occur quite to the highest point of the ridge, but with these appear some of the typical plants of the range, such as *Gastrochilus scaphochlamys*, *Geostachys elegans*, *Gahnia Javanica*, *Didymocarpus longipes*; and the elegant little palm *Pinanga paradoxa*, as well as *Licuala glabra.* One of the commonest trees here is the Pulawan, *Tristania Merguensis.* with its grey foliage and strange red stem off which the bark peels in long flakes which remain in piles at the foot of the tree. Here also grows the largest of all the Kopsias *Kopsia pauciflora Hook*, a big tree with white flowers with a pink eye. After passing the depression between Bukit Besar aud Padang Batu, the trees as one ascends become smaller and more slender and more of the typical hill plants appear. Padang Batu is a large sloping rock-face covered in part with thick grass, *Ischaemum Feildingianum*, and with *Matonia pectinata*, among which grow gnarled trees of *Baeckia*, *Leptospermum*, *Podocarpus*, *Rhodoleia* and other mountain forms, while in damp spots, especially near and in the stream are the peculiar Ophir sedges, the white flowered *Hedyotis Maingayi*, dwarf pink Utricularias, *Didymocarpus semitortus*, and the orchids *Arundina speciosa*, *Spathoglottis aurea*, and *Cypripedium barbatum.* The stream which runs down over the rocks to the west is well worth exploring as the flora is rich and interesting, for besides the hill forms which follow the sides of the stream far down, there are many peculiar plants to be found, among them the large yellow flowered shrub *Brachylophon Hulletti.* While in the damp wood by the side of the stream was found the curious *Thismia Chrysops.* Above the Padang Batu the rocks rise covered with a forest of close but small trees, the largest being *Podocarpus*, *Tristania* and *Dacrydium* and from this point to the top one gets the most characteristic part of the Ophir flora. A steady rise brings the explorer to the top of Gunong Tunduk. where there is a large bare rock from which a good view is obtainable. A short descent into a damp valley is made and then Gunong Ledang is ascended, a stiff steep climb through thickly wooded slopes. Just below the top is a very large rock with one side quite precipitous. At the base of it is a small spring. This is the old camping ground of the earlier explorers, Wallace and Griffith but it is seldom used now as the water supply is very limited. The extreme top is of no great size, in fact a very small space surrounded by stunted shrubs, Rhododendrons crimson and white, *Annesloea*, the biggest tree up here, *Rhodamnia*, etc. with pitcher plants scrambling over the bushes and in the damper more sheltered spots, below the top on the north side grow *Habenaria*, *Burmannia*, *Sonerila* and other herbs in dense deep wet moss. I was unable to collect the mosses satisfactorily on either of my visits as most were not then fruiting, and those that were collected have not yet been identified. Two mosses here however are very attractive and merit special mention. One is the very pretty *Hypnodendron arborescens*, with a slender stem from which spread out two or three whorls of golden green branches some distance apart, the whole looking like a toy tree. It occurs in many parts of the range and is indeed to be met with all over the hill ranges of the peninsula. The other is *Pogonatum macrophyllum* a tall stemmed moss 6 inches high covered with close narrow blackish green leaves.

Animal life is by no means common above Padang Batu. I saw tracks and dung of a tiger at the flat rock on the top of Gunong Tunduk, and I have also seen the footprints of a good sized deer on the highest point of Gunong Ledang, but no signs of other Mammals. Elephants were formerly common in the lower woods (Braddell in Logan's Journal vii. 1853 p. 85) and it is said that the wild dog was abundant here but it is probable that this animal has disappeared of late years as the elephants certainly have. Birds are scarce also, swallows, a small tailor bird (*Orthotomus*) and a few others are all I have seen. I captured a small brown frog in the stream and caught a glimpse of a lizard's tail disappearing in the long grass. Butterflies are few and chiefly belong to common lowland species. Beetles are not very abundant. The big stag beetle *Odontolabris Gazella* may be met with, and I have also obtained a single example of a small but very beautiful blue *Buprestis*, and a number of very small brown chafers. A large black wasp with a yellow band across its body, somewhat resembling the common *Vespa cincta*, is abundant and swarms of bees often fly over the mountain. A few grasshoppers, crickets, flies and other insects occur. Dragon flies and a species of May-fly haunt the stream. Termites occur nearly to the top of the highest point. Mosquitoes appear to be quite absent. I found a small species of scorpion in a decaying piece of wood on Padang Batu and Braddell mentions an enormous scorpion on the road to the top of Gunong Ledang. A small fresh water crab frequents the stream. It is brown with reddish claws. Land shells are mentioned as having been collected here both by Wallace and Braddell.

The lower peak of the range known as Gunong Mering I ascended with Mr. Hervey in 1892 from Lubok Kedondong. The Malays declared that it had never been ascended by Europeans, and that it was inaccessible. However the ascent proved merely a stiff climb though in parts it was found necessary to make hand rails or ladders to enable us to cross the smooth steep rocks. The camp was pitched on a Padang Batu across which ran a stream that fell in a cascade over the end of the rocks. Except at this point the stonefield was surrounded by the rising cliffs which were covered with forest. This spot was about half way up Gunong Mering. As to our being the first Europeans to ascend it, this may be considered doubtful as Griffith mentions numerous plants from Gunong Mering.

The flora of Mering is to all intents and purposes the same as that of Ledang, but a few met with here were not found upon the latter. In treating of the flora of this mountain, it may first be pointed out that in many respects it differs from that of the high lands of Perak and Selangor and more closely resembles that of Kedak Peak. It is possible, however, that this is rather due to climate than to anything else. The isolated position of both mountains their comparative proximity to the sea, and probably their greater dryness has had some effect in modifying the flora, but it should also be pointed out that neither mountain belongs to the central range but both appear to belong to quite a different system. Practically at present nothing is known as to the geology of the peninsula nor can we at present formulate even roughly any theory as to the relationships of the different hill ranges to each other. We do know, however, that the denudation of the Western side of the Peninsula has even in comparatively modern times been enormous and that the hills now small and isolated were formally of much greater attitude and formed part of a chain or extended range

The Ophir flora may be divided into three elements; 1, a purely Malayan element of lowland types which have ascended the hills, and in some cases have been so far modified as to form peculiar species; 2, an alpine element characteristic of all our hill ranges at this altitude, including the following plants, *Illicium*, *Rhododendron*, *Microtropis*, *Burmannia disticha*, *Diplycosia.* Of what may be called the northern Alpine flora we have only one example and that is a most remarkable one being *Linaria alpina*, a plant once collected on the top by Mr. Hullett and never found before or since. It is especially remarkable as the plant has not been recorded from any other part of tropical Asia, nor has any other species of the genus been met with in the Malayan region even at much higher altitudes. The third element is perhaps the most interesting. It is the Australian element, and is represented by the following genera and species. *Boeckia*, *Leptospermum*, *Tristania*, *Leucopogon*, *Dianella*, and most remarkably in the case of the *Cyperaceae*, of which six species occur here. One is a species of Scleria a genus of world wide distribution Another a species of *Fimbristylis* which occurs also in Ceylon and China, but the remaining four, are two species of *Gahnia*, a *Lepidosperma*, both typical Australian genera, and a remarkable *Cladium* apparently related more to a west Indian plant them to anything else.

This Australian element is not by any means confined to Mount Ophir. It is to be found all along the mountain ridges of the Malay Archipelago, gradually dying out as it goes westward. It is also not exclusively to be found on the hill ranges but occurs along the sandy coasts also. With the single exception of *Dianella*, however, it is completely absent from the forests of the lowlands. The following is a list of typical Australian genera of the peninsula to illustrate this peculiar element in our flora.

Boeckia, hills at 3000—4000 feet; on the sea coasts in Tringanu and Borneo.

Leptospermum, hills at 3000-4000 feet;

Tristania, hills at 3000-4000 ; sea coasts Singapore etc.

Melaleuca, ,, ; sea coasts.

Leucopogon, hills ; sea coast Singapore, Labuan.

Dischidia Rafflesiana, Mt. Ophir, ; common on sea coasts.

Nepenthes, common in the low country near the sea, and in the hills from 2000 feet upwards, absent from forest region.

Dianella, hills and lowland woods, but especially near the sea.

Cryptostylis, hills.

Corysanthes, ,,

Philydrum, sea coasts ; Singapore and Malacca.

Podocarpus, hills and sea coasts.

Dacrydium, hills.

Dammara, hills.

Lipocarpha microcephala, sandy spots.

Schoenus calostachyus, sea shores.

Cladium glomeratum, sea shores.

Lepidosperma, hills.

Gahnia tristis, hills and shores.
G. javanica, hills

Casuarina, sea shores.

The interesting thing about these is that they are quite absent from the forest country between the sea coast and the hill tops, and that they mostly represent a sand loving, or dry country flora. We know as previously mentioned that the denudation of high land at least on the West coast of the peninsula has been of very great extent and that large areas of the plain country are depositions of very recent date (geologically), and it is quite possible that these plants are the relics of a flora which formerly grew on the sandy coasts of a sea which washed the foot of Ophir.

Plants of the Upper Part of the Range.

Illicium cambodianum, Hance. (*Magnoliaceæ*). A small tree, flower pink occurs also on all the higher hill ranges of peninsula and in Cochin China.

Alsodeia lanceolata var. (*Violaceæ*). A small shrub with longer narrower leaves and less villous fruit than the Penang form, close to the Padang Batu.

A. sp. near *A. Hookeriana.* Shrub with the leaves drying black entire and few nerved, and fruit an inch long black glabrous blunt, the seed dotted all over. I have only seen fruit of this, the plant grew on Gunong Mering.

Calophyllum microphyllum Anders. (*Guttiferæ*). A small tree very abundant on all the upper part of the hill, only recorded from this locality, but I found what I take to be the same tree without flowers or fruits on Gunong Panti in Johore.

C. sp. Tree with narrow elliptic lanceolate coriaceous leaves very closely and inconspicuously nerved 3-3½ inches long ½ inch broad narrow into a petiole ¼ inch long (No. 3223) not seen elsewhere.

Garcinia montana n sp. A small tree about 15 feet tall with four-angled branches. Leaves lanceolate usually obtusely acuminate 2 inches long. 3/4 inch wide or often much smaller, thickly coriaceous, veins invisible, except the midrib which is raised on the upper surface, petiole 3/8 inch long. Male flowers solitary terminal small 1/4 inch across on thick pedicels 1/8 inch long. Sepals 4 decussate unequal ovate obtuse concave green. Petals 4 rounded striate yellowish green. Stamens connate into a sessile subglobose head, anothers numerous crowded linear, no rudiment of the pistil. Female flowers terminal on very short stalks, sepals resembling those of the male flower) Pistil cylindric, stigma capitate. Berry (hardly ripe) flask-shaped beaked 3/4 inch long, stigma flat warty. Padang Batu. Not uncommon but producing very few flowers. The plant is remarkable for its thick small leaves quite veinless except for the midrib which is elevated on the upper surface and impressed on the lower. The flowers too are remarkably small, the smallest known to me in the genus, greenish yellow and solitary on the ends of the branches.

Anneslea crassipes Hook. fil. (Ternstrœmiaceæ). A small straggling tree or large bush with leathery leaves and large white flowers, common all over the top of Gunong Ledang and Gunong Mering. Also met with in hills in Perak.

Adinandra dumosa Jack. This common lowland tree occurs on Padang Batu.

Archytea Vahlii var. Shrub on Padang Batu. Common in the low country. The form here is more stunted with bare corky white stems, the leaves crowded at the tops of the branches and the flowers on shorter stalks.

Cratoxylon microphyllum (*Hypericineæ*). A shrub growing on rocks at Padang Batu also on Gunong Mering. It is found also in Lingga and in Borneo at Sitam. (Dr. Haviland). This has not hitherto been recorded from the peninsula.

Elaeocarpus Mastersii King (*Tiliaceæ*). A shrub here quite dwarf, the leaves are smaller than in the lowland form and the nerves finely reticulate.

Impatiens Griffithii Hook. (*Balsamineæ*). A pretty pink balsam with slender red straggling stems common in damp massy spots.

Ixonanthes reticulata Jack (*Lineæ*). A small tree on Gunong Mering and Padang Batu. It attains a considerable size in low country where it is common.

Euthemis leucocarpa Jack (*Ochnaceæ*). Above Padang Batu, and on Gunong Mering. Common in the low country in sandy woods near the sea.

Gomphia sumatrana Miq. Gunong Mering and Ledang common tree in the low country.

Lepionurus sylvestris Bl. (*Olacineæ*). Mt. Ophir (Hullett). Not rare in woods in the low country, possibly collected on the lower part of the range.

Gomphandra penangiana Wall. On Gunong Mering.

G. lanceolata King. Mt. Ophir (Griffith). Both common shrubs in the low country also.

G. sp. With thick ovate leaves 2 inches long and one inch wide. Fruit nearly half an inch long, on Gunong Mering. A very distinct plant but I have seen no flowers.

Ilex sclerophylla Hook fil. (*Ilicineæ*). A shrub or small tree with rather large thick leaves. Above Padang Batu rare and confined to Mt. Ophir.

I. Griffithii Hook fil. A shrub with pink flowers common all over the upper part of the hills, occurs also in India, Java, and Sumatra.

I. sp. near *Malabarica.* Collected both by Mr. Hullett and myself. Above Padang Batu. Unfortunately the specimens are hardly adequate for description.

Microtropis Ophirensis n. sp. A tree with whitish bark, leaves opposite lanceolate or ovate lanceolate blunt narrowed at the base coriaceous 2-3 inches long, 1½ inches wide, nerves above invisible, beneath 7 or 8 pairs interarching within the margin, petiole 1/8 to nearly 1/4 inch long, thick. Cymes very shortly peduncled axillary or with long peduncles about an inch long and dichotomously branched. Flowers few together small white. Calyx lobes 5 scale like rounded with a subscarious irregularly toothed margin. Petals 5 in two whorls ovate sub-acute. Stamens

5 attached to the petals free portion of filament short, anther-cells separated oblong obtuse. Style thick, stigma broad curved. Fruit 3/4 inch long elliptic narrowed at the base with a curved acute beak. Gunong Mering and Gunong Ledang. Allied to *M. elliptica* King, a Penang hill plant, but with much more coriaceous leaves with inconspicuous nerves. The leaves vary, however, one form from the lower part of the range has much larger leaves elliptic or ovate acuminate 4 inches long by 1½ wide, while those from the top of the mountain are much smaller and narrower.

Euonymus Javanicus Bl. Close to Padang Batu; a widely distributed shrub occurring on most of our higher hills as well as in the low country.

Pygeum brevifolium Hook. fil. (*Rosaceæ*). A bush or small tree with small white flowers and globular one or two seeded green fruits. Common all about the top of the hills, only known from this locality.

P. Griffithii Hook. fil. A slender little tree or bush with larger red tomentose branches, flowers small white. Peculiar to Mt. Ophir.

Weinmannia Blumei Planch. (*Saxifragaceæ*). A tree with pinnate leaves and racemes of pinkish white flowers occurs on the Perak hills also.

Drosera Burmanni Vahl. (*Droseraceæ*). Mossy spots on Gunong Mering. The plants here all had green not red leaves, as they have in the lowland district. This our commonest sun dew, occurs usually in sandy spots near the sea and rivers. It is very widely spread from West Africa all through the East Indies to China, Japan and Australia.

Rhodoleia Teysmannia Miq. (*Hamamelideæ*). A tree with small pink flowers occurs also on Kedah Peak in Perak and Sumatra. The only other species known grows in Hongkong.

Boeckia frutescens L. *(Myrtaceæ)*. "*Daun Chuchor atap*." A tree or shrub with rough flaky bark, and narrow setaceous leaves strongly aromatic, and small white flowers. The wood is exceedingly hard and compact, dark brown. The leaves used as tea give a refreshing aromatic drink and are much used as medicine by Malays. It is common all over the lower and the upper part of the range and occurs in most of the hill ranges of the peninsula.

Leptospermum amboinense Bl. A shrub with stiff lanceolate leaves and fairly large white flowers. Like the last is very aromatic and the leaves are used in the same way.

Tristania Merguensis Griffith. Pulawan. A big tree with very grey foliage, flowers yellowish. Common.

Rhodamnia trinervia Bl. A compact bushy form with rounder ovate leaves. It is common in the low lands.

Decaspermum sp. A shrub with coriaceous alternate ovate or broadly lanceolate leaves blunt about 2 inches long and one wide, flowers small white, petals five. Fruit small globose terminated by the calyx lobes, seeds 5 hard and bony, punctate, backs rounded, inner edge angled. Common on Ledang. Also occurs on Kedah Peak. I can find no description to suit this species, but as Sir George King will shortly describe the *Myrtaceæ* of the peninsula I think it not advisable to name it.

Eugenia sp. A shrub with slender branches, ovate or elliptic leaves with a long blunt point, an inch and a half long ½ inch wide, petiole very short and slender. Cymes terminal and axillary. Flowers small, crowded, with pedicle and tube 1/4 inch long white. Common

E. Maingayi Duthie? What I suppose to be this plant was collected on Mt. Ophir by Mr. Hullett.

Melastoma decemfidum Roxb. (*Melastomaceæ*). The beautiful large flowered species common on all the hills.

M. Malabathricum var. *appressum*. Padang Batu. The common hill form of this variable plant.

Dissochæta annulata Hook. fil. Climber with rosy flowers on Padang Batu. Common in the low country.

Medinilla Hasseltii Bl. On trees, the large and fine variety *Griffithii* occurs here. Common in the low country.

M. Maingayi C. B. Clarke. Epiphytic. Common in the low country.

M. Clarkei King. A shrub with waxy flowers, common on the top of the mountain.

Pachycentria tuberculata Korth. Epiphytic. Common in the low country.

Sonerila tenuifolia Bl. A slender herb with rosy flowers above Padang Batu. Also occurs in Perak, Sumatra, Java, and Borneo.

S. Griffithii C. B. Clark. A very delicate succulent herb with deep mauve flowers, damp spots. Only known locality.

S. picta Korth. Verh. Nat. Gesch. Bot. p. 249. Pl. 52. Occurs in the depression between Padang Batu and Gunong Tunduk. This is apparently a widely distributed and very variable plant. In large plants the leaves are long and elliptic lanceolate narrowed at the base into rather a long petiole. They are usually green with paler backs, and with 5 to 7 conspicuous veins on the back, but the leaves are also sometimes beautifully banded on the centre and lateral veins with silver, or again they may be ornamented with white spots. Smaller plants often only three or four inches tall have rounded leaves almost ovate. One of these dwarf forms is distributed in Dr. Haviland's Bornean collection under the number 1284 and Dr. Stapf describes this in the flora of Kinabalu as *Sonerila maculata* var. *glabrata* but it does not appear to me to be at all related to the plants named *Sonerila maculata* in Wallich's Catalogue. (Silhet 4091 B.) nor figured in the *Plantæ Asiaticæ rariores*.

I have met with the plant on Gunong Panti (Johore). Bukit Hitam (No. 7,321), Bukit Kutu (7,316 a large form); the

Tahan valley woods and Kota Glanggi (Pahang) dwarf forms, with spotted leaves; Maxwell's hill (Perak) as also on Mt. Ophir (dwarf form). In Sumatra at Sungei Kelantan, Siak, I found the beautiful silver barred form figured by Korthals, (8,994, 8,968) and Mr. Hullett collected a dwarf form similarly coloured at Sungei Bei in Lingga. In Borneo Dr. Haviland collected it at Tawarar, and also in Quop (Sarawak) and I found it at Bongaya in Sandakan.

Memecylon acuminatum Sm. Shrub, flowers blue.

M. campanulatum ? Shrub.

Hydrocotyle Asiatica L. (*Umbelliferæ*). The Pegaga occurs near the camping ground where it has evidently been accidentally introduced. It is however mentioned in Griffith's list.

Homalium longifolium Benth. Gunong Mering.

Dendropanax Maingayi King. (*Araliaceæ*). A small shrub 1 to 2 feet tall with green flowers and grey fruit at length becoming black. Common. Also occurs in Perak and on Kedah Peak.

Arthrophyllum pinnatum Clarke. Shrub 3 to 4 feet tall with pinnate leaves. Common. Padang Batu and also above on occurs on Penang Hill and in Perak.

Argostemma hirta n. sp. (*Rubiaceæ*). Herb with a creeping stem ascending for about 6 inches. Leaves numerous unequal one of each pair much larger than the other lanceolate acuminate base inequilateral, 3 inches long 1/2 inch wide, petiole 1/8 inch long; all covered with long white hairs; smaller leaf ovate acute 1/4 inch long or less, light green above white beneath. Cyme terminal shorter than the leaves, peduncle 1/2 inch or less, branches few. Calyx lobes lanceolate acuminate 3/8 inch long, all covered with white hairs. Corolla lobes lanceolate acuminate sparsely hispid white. Stamens connivent, anthers nearly 1/4 inch long subulate. Style very slender. Stigma minute capitate. On Gunong Tunduk, also Perak, Maxwell's Hill, Bujong Malacca; Penang Hill; Selangor, Pahang track. A remarkably hairy species.

A. *æquifolia* n. sp. Stem creeping and rooting ascending portions short only three or four inches tomentose. Leaves in many equal pairs, leaves of each pair similar and equal lanceolate or ovate 1/2 inches long ½ inch wide, acute base rounded, above sparsely tomentose, chiefly on the nerves, beneath scabridly tomentose, nerves ascending about 6 pairs, petiole tomentose 1/2-1/4 inch. Stipules ovate. Cyme terminal few flowered. Flowers rather large 3 or 4 together, pedicels 1/4 inch long. Calyx lobes ovate pubescent short. Corolla lobes lanceolate glabrous nearly 1/2 inch long white Anthers connivent acuminate, not subulate. Fruit hairy. Creeping on rocks in the stream on Padang Batu and up to Gunong Tundok.

In general appearance this somewhat resembles *A. elatostemma* of the Penang Hills, but its leaves are equal with long petioles and the flowers are much larger.

A. *Ophirensis* Maing. Common especially in the woods below Padang Batu.

Hedyotis congesta Br. A narrow-leaved form of this common lowland plant grows above Padang Batu.

H. *Maingayi* Hook. fil. A little shrubby plant with white flowers, common in the rocks, in the stream and elsewhere all over the hill, not known elsewhere.

H *flexuosa* n. sp. A tall slender herb over a foot tall simple or branched stem obscurely angled. Leaves ovate lanceolate coriaceous acuminate narrowed at the base into the petiole, 3 inches long by one wide nerves very indistinct, drying light green, petiole 1/4 inch long, stipules small ovate entire. Inflorescence terminal or axillary laxly panicled branches very slender zigzag. Flowers very small 1/8 inch long, white on short pedicels. Calyx campanulate lobes ovate acute. Corolla tube half as long again shorter than the limb, lobes obtuse tube hairy in the mouth. Stamens anthers long linear, capsule subglobose dehiscing along one side, less than 1/8 inch long terminated by the calyx lobes. Seeds one in each cell.

Gunong Ledang on Padang Batu, Gunong Mering (3,212) Hullett (766). Allied to *H. viscida* Bedd.

Pavetta humilis Hook. fil. Dwarf shrub flowers white. Gunong Ledang.

Urophyllum sp. Shrub with a white corky stem, leaves elliptical lanceolate coriaceous acuminate flowers white. Common above Padang Batu.

U. sp. near *U.streptopodium* Bl. But with small subterminal corymbs and flowers. Mt. Ophir (Hullett).

Timonius Jambosella Thw. Common low country tree. A shrub on Mt. Ophir.

Chasalia curviflora var. *longifolia*. The narrowed leaved form of this very common white flowered shrub occurs about Padang Batu.

Cephaelis cuneata Korth. Shrublet with honey yellow flowers and blue fruit. Common near the top. Not rare in the low country.

Lasianthus Chinensis Benth. Shrub. Common.

L. Wightianus Hook. fil. Mt. Ophir (Griffith) not seen.

Psychotria sarmentosa Bl. Climber with greenish flowers. The form here has thicker and brighter green leaves than the common low country form.

Ps. stipulacea Wall. A shrub, Gunong Mering. Common in the low country.

Hydnophytum formicarium Jack. The common ant plant, epiphytic on Mering and Ledang.

Vaccinium bancanum Miq. (*Vacciniaceæ*). Mt. Ophir. (Maingay), I have not met with this here. It is not rare in the low country, near the sea, and on Kedah Peak.

V. sp. Shrub with elliptic coriaceous leaves 1½ inch long ½ inch wide with a pair of nerves running from base upwards from above the mid rib parallel to the edge, fruit globose flattened at the top on slender pedicels; only 4 or 5 on a raceme. Gunong Tunduk. I only found a very little in fruit but it seems distinct from *V Bancanum.*

Diplycosia microphylla Becc. (*Ericaceæ*). Common. Occurs on all the higher hills.

Rhododendron Malayanum Jack. A shrub with tubular crimson flowers. Common up to the top. Occurs on most of the higher hills of the peninsula.

R. jasminiflorum Hook. Shrub flowers white, leaves elliptic thick. Common.

Leucopogon Malayanus Jack (*Epacrideæ*). Shrub with stiff narrow leaves, small white flowers, and very small orange coloured fruit. Padang Batu. Griffith distinguishes the Mt. Ophir plant from the sea shore one, under the name of *L. ophirensis* (Journ. As. Soc. Bengal XXIII 623-650.)

Myrsine capitellata Wall. (*Myrsineæ*). Shrub or small tree flowers small white, fruit globular small white. Upper part of the hill. Common in the low country especially near the sea.

Embelia Myrtillus Kurz. A scandent shrub with small rounded leaves and very small flowers white. Common. Above Padang Batu.

Ardisia Andamanica Kurz. Gunong Mering and Ledang.

A. oxyphylla Wall. Above Padang Batu.

A. colorata var. *polyneura.* Padang Batu. A shrub with ovate acute leaves strongly and finely reticulate on both surfaces. It looks very different from the low land form.

A. tuberculata var. *ophirensis.* Mt. Ophir (Griffith) not seen as high up as Padang Batu.

A crenata Roxb. var. *angusta*. A slender branched plant with lanceolate leaves narrowed at both ends, crenate. Fruit on long slender pedicels as big as a pea. Above Padang Batu. I have also met with this on the Pahang track in Selangor.

A. sp. With lanceolate leaves narrowed at both ends, coriaceous nerves invisible above, panicle terminal rusty-scaly with rather large numerous flowers. Calyx lobes large rounded. Gunong Tunduk.

Diospyros lucida Wall. (*Ebenaceæ*). On Gunong Ledang. Common in the low country.

Symplocos Ophirensis Clarke. (*Styraceæ*). Shrub flowers white. not rare on Gunong Ledang. Only known locality.

S. crassipes Clarke. Only known locality, and collected by Maingay.

S. Henscheli Benth. Shrub with blue fruit, and var. *hirtistylis* Clarke. Only known locality.

Jasminum laurifolium Roxb. (*Oleaceæ*). Climber flowers white. Gunong Ledang to the top. Also occurs in India, Burmah and Perak.

Alyxia pilosa Miq. (*Apocynaceæ*). Climber. Gunong Mering and Ledang. Also Selangor on Bukit Kutu, Sumatra and Borneo.

A. pumila Hook. fil. Climber. Common on the slopes above Padang Batu also occurs on Kedak Peak. Both of these have very sweet scented bark used by Malays in medicine under the name of Pulasari, Ampelas Wangi, etc.

Kopsia pauciflora Hook. fil. Mt. Ophir (Maingay). What I take to be this is a big tree, with white flowers with a pink eye. It grows below Pahang Batu in the forest.

Alstonia macrophylla Wall. A tree flowers white about Padang Batu.

Wrightia lævis Hook. fil. Mt. Ophir (Maingay). I have not found this here.

Hoya caudata Hook. fil. (*Apocynaceæ*). Climber, flowers small pinkish white with long tails to the petals. "Akar Supah". on Gunong Mering.

H. multiflora Bl. Epiphytic not climbing; Mt. Ophir. (Maingay) I have not seen this here.

Dischidia albida Griff. Creeping on trees Gunong Tunduk. I have also met with it in Singapore at Bajau, but nowhere else.

D. Rafflesiana Wall. Common on both peaks. Abundant on sea shores and near the sea, in the low country.

Fagræa obovata var. *(Loganiaceæ).* Shrub, rocks just below Padang Batu.

Utricularia Ophirensis Ridl. (*Lentibularieæ*). A small pink flowered plant common in damp spots on Padang Batu etc.

U. minutissima Vahl. A very small mauve flowered kind.

U. orbiculata Wall. A minute plant in the drip under the big rock on the top of the hill.

U. Wallichiana Wight. A slender climbing plant among grasses, flowers yellow.

Linaria alpina L *(Scrophularinæ).* Top of Mt. Ophir (Hullett). No one else has found this little plant in the Malay Peninsula, nor has it been recorded from India.

Aeschynanthus Lobbii Br. *(Cyrtandreæ).* Grows just below Padang Batu.

Didymocarpus semitorta Clarke. A pretty little plant with silky silvery leaves and white or violet flowers. Common on rocks in the stream only known locality.

D. marginata Clarke. Creeping plant with violet flowers in the wood below Padang Batu.

D. cordatus var. *ophirensis.* Flowers white; rocks just below Padang Batu.

D. longipes Clarke. A very distinct plant with a rosette of dark green leaves purple on the back and bright yellow tubular flowers. All over the hills, peculiar to Mt. Ophir.

Nepenthes Rafflesiana Jack. (*Nepenthaceæ*). Very fine and large. Abundant to the top with the following.

N. phyllamphora Willd.

N. sanguinea Lindl. The red pitcher plant, for which Mt. Ophir has long been famed.

N. albomarginata Lobb. Also occurs in Penang.

Balanophora multibrachiata. Fawc. (*Balanophoreæ*). This is apparently parasitic upon *Dacrydium* here. It appears to have been overlooked by all the Ophir collectors, probably from the fact that the tuberous rhizome is most entirely subterranean and the flower spikes only appear at certain times. The large warty rhizome is yellowish brown, the scale leaves and flower-spikes red. It is not rare on Gunong Ledang, and occurs also in Java.

Litsea zeylanica. Nees. (*Laurineæ*). Mt. Ophir (Griffith) I have not met with this. It is a common plant in the low country country, near the sea.

L. sp. with rather large leaves glaucous and pubescent beneath. Specimens too incomplete.

Loranthus retusus Jack. (Loranthaceæ). Parasitic on *Dacrydium.* Gunong Mering and Ledang.

L. Lobbii. Hook. fil. Flowers yellow. Gunong Ledang.

Viscum japonicum Thunb. A very odd little mistletæ parasitic on Rhododendron here. I found it parasitic on *Alyxia* in Kedah Peak. On the top of Gunong Tundok.

Henslowia Lobbiana A. Dec. (*Santalaceæ*) The Mt. Ophir form of this climber seems to me the same as that of the sea coasts, but the leaves are on the whole a little larger. Common above Padang Batu.

H. buxifolia Bl. On Gunong Mering. This is an erect shrubby plant entirely yellow. It occurs in sandy woods in Singapore and elsewhere.

Phyllanthus frondosus Wall. (*Euphorbiaceæ*). A bright green shrub or small tree. Fruit globose or three lobed red. Common all the hill, and also in the low country.

Ph. gomphocarpus King. Shrub, flowers red Gunong Mering, and Ledang.

Cleistanthus Maingayi Hook fil. Mt. Ophir. (Hullett).

Breynia discigera Muell. By the stream, Gunong Mering.

Gelonium sp. Shrub with white branches, very narrow lanceolate leaves and very small white flowers, male only seen. Gunong Mering.

Croton erythrostachys Hook fil. Shrub on Padang Batu.

Trema angustifolia Bl. *(Urticaceae).* Shrub, Padang Batu. Not rare in the low country.

Phyllochlamys Wallichii King. Thorny shrub. All over the hills.

Ficus diversifolia var. *spathulata.* Common on the hills.

Gnetum Brunonianum Griff. A low slender shrub by Padang Batu. In the flora of British India this is classed as a synonym of *Gnetum Gnemon*, but that (which is only cultivated here) is quite a tall tree. *G. Brunonianum* occur in Malacca, Pahang, etc.

Podocarpus neriifolia Don. A tree common on Padang Batu. This form has longer and more acuminate leaves than the one so common in sandy places by the sea.

Dacrydium elatum var? The tree on Mt. Ophir seems to be entirely different from the *Dacrydium elatum* of Penang hill. It is a dwarfer tree with finer narrow and softer leaves, and has no strictly fertile branchlets with the appressed scaly leaves so characteristic of that species. The fruit is produced on the ordinary branchlets with long leaves. The seeds are as large as those of the Penang plant but the cuplike scale at the base is quite twice as large, forming a regular cup extending half way up the seeds. The tree itself resembles a young or stunted spruce fir. It occurs also on Bujong Malacca. Can it be the plant described as *Dacrydium beccarii* A Dec. from Mt. Poe in Sarawak?

Orchids are by no means as abundant here as on Kedah Peak and on other hills of this altitude, but there are some very beautiful ones which are well known in cultivation.

Liparis Maingayi Ridl. grows on the rocks below Padang Batu in wet spots.

L. elegans Wall. A widely distributed epiphytic species common above Padang Batu.

Platyclinis linearifolia Ridl. *Dendrochilum linearifolium* Hook. fil. Flor. Brit. Ind. V. 702. A small insignificant plant, with crowded pseudobulbs and small brownish flowers, common on trees from Padang Batu upwards. Also met with in Perak.

Dendrobium Kelsalli Ridl. Common on trees, Gunong Tundok.

D. uniflorum Griff. This is the prettiest Dendrobium here. Its large white lips making it quite attractive, though the flowers are not large. Common high up, and occurs also in Perak.

D. villosulum Wall. One of the few terrestrial species, of the genus, with tall slender stems narrow leaves and inconspicuous flowers, common above and below Padang Batu. It grows also in Singapore, Penang and Kedah in dry woods.

Cirrhopetalum vaginatum Lindl. Gunong Ledang.

C. citrinum Ridl. Gunong Mering and Ledang.

Eria nutans Lindl. This common plant grows up as far as Gunong Tundok.

E. tuberosa Hook. fil. Gunong Tundok and Padang Batu.

E. monticola Hook. fil.

E. vestita Lindl.

E. velutina Lindl.

E. pellipes Rchb. f. "Angrek Gading," so called from its tusk-like leaves, common on trees Padang Batu.

Ceratostylis gracilis Bl. Above Gunong Tunduk.

Claderia viridiflora Hook. fil. Common up to Padang Batu.

Spathoglottis aurea Lindl. This beautiful yellow flowered terrestrial orchid grows in and about the stream on Padang Batu.

Tainia speciosa Bl. On mossy stumps above Padang Batu.

Cœlogyne tomentosa Lindl. Common all over the hill.

C. Cumingii Lindl. This beautiful plant is abundant on Gunong Mering growing in huge masses on the rocks. It occurs all over the peninsula but in the low country grows only on the branches of lofty trees.

Calanthe angustifolia Lindl. Occurs in the woods below Padang Batu and more sparingly above.

Arundina speciosa. Bl. Still fairly abundant on and round Padang Batu though much persecuted by orchid collectors. The local form is a very good one.

Bromheadia pungens Ridl. On trees above Padang Batu the only known locality.

Br. rupestris Ridl. Rocks and trees, Gunong Mering and Padang Batu, occurs also on Kedah Peak.

Br. alticola Ridl. Trees on Padang Batu.

Br. aporoides Rchb. fil. Also grows here.

Renantherella histrionica Ridl. Gunong Mering. It also occurs in Singapore near the sea.

Podochilus microphyllus Lindl. Common on the trees.

Appendicula callosa Bl. Gunong Mering.

Tropidia squamata Bl. Widely distributed about Padang Batu.

T. Maingayi Hook fil. Just below Padang Batu. Rare. The only known locality.

Macodes petola Lindl. Damp spots.

Anoectochilus geniculatus Ridl. Gunong Tundok and below.

Hetæria elata Hook. fil. Lower slopes of Gunong Tundok.

Habenaria zosterostyloides Hook fil. Gunong Mering and Gunong Ledang. Also Perak.

H. monticola Ridl. A small green flowered species around Padang Batu in wet spots, also on Kedah Peak.

Cypripedium barbatum Lindl. Less common than formerly but still to be found at Padang Batu. Occurs also in Penang, Kedah Peak, and Johore, Gunong Panti.

Apostasia nuda Br. (*Apostasiaceæ*). Common.

A. latifolia Rolfe. Rare, woods below Padang Batu, also Perak.

Gastrochilus scaphochlamys Ridl. (*Scitamineæ).* Very abundant below Padang Batu, rather scarcer above. The only known locality.

Zingiber gracile Jack. Just above Padang Batu, common in many parts of the peninsula.

Geostachys elegans Ridl. Common to the top of the mountain. Only known locality.

Discorea laurifolia. Wall. (*Dioscoreaceæ.)* On Mering and Ledang.

Curculigo latifolia Dryand. *(Amaryllideae).* Above Padang Batu Common.

Burmannia disticha L. (*Burmanniaceæ*) Common. The flowers are often bright blue, here they are sometimes nearly white except for the green calyxlobes.

B. tuberosa Becc. Just below Padang Batu.

Thismia Chrysops Ridl. On rotten logs below Padang Batu near the big rock.

Dianella ensifolia Red. (*Liliaceæ*). Common to the top.

Dracaena gracilis Wall. Common, also in the low country.

Smilax calophylla Wall. Small erect shrub common in the lower woods ascending above Padang Batu.

S. myosotiflora Dec. Climber, flowers green. Gunong Ledang. Widely scattered in the peninsula.

S. læris var. *ophirensis*. Mt. Ophir (Griffith).

Homalomena angustifolia Hook fil. var. *ophirensis*. Stem long creeping with numerous woolly roots. Leaves ovate to almost lanceolate blunt or acute with a rounded not cuneate base, nerves 3 to 5 pairs ascending 2-3 inch long, 1-1/2 inch wide, dark green, petiole 3-6 inches long slender sheath 1/2 inch long, and base of petiole red, Spathe on a short peduncle green 1/2 inch long, fusiform beaked. Male portion of spadix slender 3 times as long as the female portion. Pistils 2 or 3 whorls, round, stigma disc shaped. Abortive flowers one to each pistil. In crevices of the rocks in the stream Padang Batu. (also Kedah Peak). This variety differs really solely in the form of the leaf, which, however, keeps true under cultivation. I have seen leaves quite intermediate between the narrow lanceolate leaves acuminate at both ends, the Penang Hill form and the broad leaved Ophir form.

Pinanga paradoxa Scheff. *(Palmæ)*. A very elegant little palm with a slender stem about 8 feet tall. Common below Padang Batu rarer above. Also occurs in Perak.

Licuala glabra Griff. Stems short to about 4 feet tall, stout, occurs also in Perak.

Calamus exilis Griff. A very slender rattan, "Ratan Batu." Common. It occurs also in Perak. I am doubtful as to its being distinct from *C. ciliaris* Bl. of Java.

Plectocomia sp. Occurs above Padang Batu. I have never seen flowers or fruit.

Pandanus ornatus (*Pandaneæ*). I believe this is the Pandan common above Padang Batu, but have not got flowers or fruit. It is very common all over Malacca.

Freycinetia angustifolia Bl. Above Padang Batu.

F. insignis Bl. The common low country plant.

Fimbristylis actinoschoenus Clarke. (*Cyperaceæ*). Common on Padang Batu.

Cladium Maingayi C. B. Clarke. A broad leaved sedge very common on Padang Batu, only known locality.

Lepidosperma Chinense Nees. On Padang Batu and by the big rock on the top of the hill. Also occurs in Southern China. The other species of the genus between 30 and 40, are all Australian.

Gahnia tristis Nees. Padang Batu. Common in Singapore near the sea.

G. javanica var. *penangensis*. A handsome tall sedge with narrow grassy leaves and a large black panicle, common, also occurs in Penang, Perak, etc.

Scleria multifoliata Boeck. var. *ophirensis*. Common on Padang Batu. Occurs also in Pahang and most other hill regions of the peninsula, and also in Singapore.

Ischaemum Feildingianum Rendle. (*Gramineæ*). A coarse grass very common on Padang Batu. Only known locality.

Isachne Javana Nees. Padang Batu, also found in Burmah, Perak and Java.

Paspalum conjugatum Berg. I found this grass once by the stream at the camp, doubtless introduced accidentally.

Ferns.

Gleichenia circinnata Sw. Common on wet rocks.

Gl. flagellaris Spr.

Alsophila commutata Mett. Above Padang Batu. A dwarf tree fern.

Matonia pectinata Br. This fine fern is very common round Padang Batu.

Hymenophyllum polyanthos L. var. *Blumeanum.*

H. Neesii Hook.

Trichomanes digitatum Sw.

Tr. rigidum Sw.

Tr. gemmatum Sw. Common.

Tr. pallidum Bl. Gunong Tundok.

Tr. obscurum Bl. ,,

Tr. apiifolium Presl. Mt. Ophir. (Dr. Kings' collector, fide Beddome).

Humata angustata Wall. Common.

H. sp. Rocks. Padang Batu (3,339).

Microlepia pinnata Cav.

Lindsaya cultrata Sw.

L. orbiculata Lam.

L. lancea L.

L. rigida Sm.

L. Walkeræ Hook. Wet spots Mering.

Schizoloma davallioides Bl.

Pteris aquilina L.

Oleandra neriiformis. Cav.

Polypodium hirtellum Bl.

P. cucullatum Nees.

P. Malaccanum Bak. On the top of the hill. Only known locality.

P. trichomanoides Sw.

P. decorum Brack.

P. alternidens Ces.

P. nutans Bl. Mt. Ophir (Moore's Herb Beddome,) not seen.

Niphobolus acrostichoides Sw.

Dipteris Horsfieldii Br. Common. This fern also occurs on the sea shore in Singapore.

D. Lobbiana Hook. Common in the stream.

Vittaria falcata Kze. On trees.

V. sulcata Kuhn. ,,

Toenites blechnoides Sw. Common.

Elaphoglossum Norrisii Hook.

Chrysodium bicuspe Hook. On the ground near the stream Padang Batu.

Schizæa Malaccana Bak. On the top of the hill.

Lycopodium cernuum L. (*Lycopodiaceæ).*

L. phlegmaria L. Gunong Mering.

L. Casuarinoides. Climbing on trees, up to the top of the hill.

Selaginella atroviridis Spring. Padang Batu and above.

Se. oligostachya Spr. Creeping on the ground.

Se. monospora Spr.

Se. trichobasis Bak.

Se. Ridleyi Bak. In the stream on Mering, only known locality.

A List of the Butterflies of Mt. Penrissen, Sarawak, with Notes on the Species.

BY R. SHELFORD.

The species here noted were obtained in May 1899, at elevations varying from 2,800 to 4,200 feet, and though I have no doubt that collecting at different times of the year would reveal the presence of a few more species, the present list may be regarded as fairly complete. Butterflies on Penrissen were not nearly so numerous as they are at all times of the year on the mountains near Kuching, Mts. Matang and Santubong; the very rank and dense jungle of Penrissen and the total absence of cleared spaces such as occur on the two latter mountains no doubt account for this comparative scarcity; at the same time it should be noted that the collection now described, contains several species which have never, in spite of the most careful and frequent collecting, been recorded from Matang and Santubong, and these species give quite a distinctive character to the collection. The insect fauna of a mountain possesses all the characteristics of an insular fauna consisting of

(1) widely ranging *low-country* species (comparable with the continental species of an insular fauna).

(2) species closely allied to, perhaps merely varieties of the above, but constant in their differences and mountain habitats.

(3) widely ranging *mountain* species of common occurrence on most mountains, of very rare occurrence in low-country, (comparable with insular species occasionally found on ther continental areas).

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* Novitates Zoologicae Vol. VI. No. 2 (1899) contains an interesting paper of the birds of the Galapagos Islands by Rothschild and, Hartert the distribution of the species there recorded is closely parallel by the distribution of the insects of Bornean Mountains.

(4) purely local mountain forms. It is especially these last that give the distinctive character or—if I may be allowed the expression—the touch of local colour to a collection formed on *any* given mountain. The table of species of butterflies captured on Mts. Matang, Santubong and Penrissen given at the end of this paper will best illustrate the above-stated facts. I have prepared a similar table of the Longicorn beetles of the three mountains, which is equally suggestive.

Fam. *Nymphalidæ.*

Sub. fam. *Danainæ.*

(1) Hestia lynceus (Drury).

Both the typical form and the melanic variety which has been separated by Moore as a distinct species, *reinwardti*, were common at all elevations.

(2) Ideopsis daos (Boisd.)

(3) Danais (*Bahora*) *aspasia* (Fab.)

(4) Danais (*Parantica*) *borneensis* (Jenner Weir).

This species was described as belonging to the sub-genus Chittira, but seeing that the male has androconia on the lower median and submedian veins, it must fall into the sub-genus Parantica.

The species was very common and easily caught, as it generally flew with the slow flaunting flight so characteristic of the members of this "protected" sub-family. Also recorded by Dr. Hanitsch from Kina Balu.

(5) Danais (*Caduga*) *larissa* (Feld.)
Fairly common at all elevations. The Sarawak Museum collection contains also one example captured near Kuching.

(6) *Euplæa* (*Trepsichrois*) *mulciber* (Cram.)

(7) *Euplæa* (*Danisepa*) *lowei* (Butl.)

The males of this species are abundant throughout the whole of Borneo, whilst the females are extremely rare, on the other hand the females of *E. rhadamanthus* (Fab.), the continental topomorph of this species, are plentiful enough both in the Malay Peninsula and in Singapore. the reason of the relative differences in the number of the sexes in two such closely allied species is a problem not easy of solution, as, perhaps bearing indirectly on this problem it should be noted that ♀ *lowei* and ♀ *rhadamanthus* differ markedly from each other than do the ♂ ♂.

(8) *Euplœa* (*Tronga*) *crameri* (Lucas).

Sub. fam. *Satyrinæ.*

(9) *Mycalesis* (*Satoa*) *maianeas* (Hew.)

The only species of this large genus that was seen.

Sub. fam. *Elymniinæ.*

(10) *Elymnias lais* (Cram.)

The male mimics the Danaid. *D. larissa* (Feld.) the female mimics *Euplœa mulciber* (Cr.)

(11) *Elymnias?* sp. nov.

This species, whose nearest ally is *E. lutescens* (Butl.), is apparently new to science and will shortly be described in a forthcoming memoir on some mimetic insects from Bornec: it is a mimic of *Euplœa crameri* (Luc.) The Oriental mimetic *Elymniines* mimic their *Danaiinæ* models on the upperside only, the underside is "protectively" coloured and mottled, so that when at rest they are not easily seen; they furnish in fact an example of a double means of protection. (1) by mimicking distasteful butterflies (2) by simulating dead leaves. The first means of protection comes into play only when the insect is flying. The second only when the insect is at rest. Those species which mimic the distasteful *Pieridæ* do so on both the upper and under surfaces of the wings and thus have only the one means of protection.

Sub fam. *Amathusiinæ.*

(12) *Thaumantis odana* (Godt).

This handsome species was not uncommon up to an elevation of 3500 feet. It had an annoying habit of settling amongst the creepers of a very thorny rattan and it was no easy matter to procure a specimen.

Sub. fam. *Nymphalinæ.*

(13) *Cupha erymanthis* (Drury).

(14) *Atella sinha* (Kollar).

(15) *Atella alcippe* (Cram).

(16) *Terinos clarissa* (Boisd). Occurred round our hut (3,500 ft.)

(17) *Cynthia deione* (Erich). A very common species of the low country.

(18) *Cirrochroa orissa* (Feld).

(19) *Limenitis procris* (Cram). A common low-country species.

(20) *Athyma abiasa* (Moore).

(21) *Symphædra dirtea* (Fab).

(22) *Euthalia ambalika* (Moore).

(23) *Euthalia Whiteheadi* (Grose Smith). Also abundant on Matang.

(24) *Symbrenthia hypatia*, var. *hippocrene* (Staud).

(25) *Cyrestis nivea* (Zinken-Sommer).

(26) *Cyrestis? semi-nigra* (Grose Smith).

The description of this species previously recorded only fron Kina Balu is somewhat sparse, but I am nearly sure that my identification is correct, at any rate it would be unwise to describe the Penrissen specimens as a new species without a comparison with Mr. Grose Smith's types. The nearest ally of the species is *C. irmæ* Forbes

(27) *Chersonesia rahria* (Horsf and Moore).

Fam. *Lemoniidæ.*

Sub fam. *Nemeobiinæ.*

(28) *Zemeros albipunctata* (Butl.)

Fam. *Lycænidæ.*

(29) *Neopithecops zalmora* (Butl.)

One example with a white discal patch on the upperside of the forewing. Specimens, corresponding to the wet and dry season forms of this species in India, occur in Borneo, but occur quite independently of the season. A so-called wet season form may be captured in the S. W. monsoon and vice versâ; the same is also true of the Satyrid *Melanitis ismene* (Cram.); of this species the Sarawak Museum possess a long series of the typical form and another of the form *leda* (L.) captured in nearly every month of the year, and all within a radius of two miles of Kuching. The difference between the wet and dry seasons is not nearly so well-marked in Borneo as in India, and I imagine that the colouring of butterflies exhibiting seasonal changes is determined by the state of the weather during the early stages of the life history, so that a wet August (for example) would produce the wet-season form, a dry August the dry-season form; in Borneo, at least, these forms should rather be called weather-varieties, occuring as they do, independently of the seasons.

(30) *Cyaniris placidula* (Druce). Previously recorded from Kina Balu.

(31) *Cyaniris selma* (Druce).

Upperside-forewing, pale blue with a white discal patch and with broad black costal and outer margins. The cell is closed with a small black stigma. *Hindwing*, greyish blue, the cell is closed with a stigma. A marginal series of fuscous spots. *Underside*, exactly as in male.

(32) *Cyaniris strophis* (Druce).

(33) *Cyaniris planta* (Druce).

This species leads up to *C. haraldus* (Fab.) placed by some authors in a separate genus—*Lycœnopsis.*

(34) *Nacaduba* sp?

A couple of females only were taken, and though I am strongly of opinion that they will constitute a new species. I defer a description until I can procure a male. The colouration and markings are much the same as in *N. aluta* (Druce.) but there is no basalband on the underside of the forewing as in that species.

(35) *Arhopala similis* (Druce).

This is the variety a of *A. agesiase* (Hew.)

(36) *Tajuria isaeus* (Hew.)

(37) *Biduanda* sp? (Nov.)

I am pretty confident that this species of which one female example was taken, will prove to be new, but I must defer a description of it until I can obtain access to larger collections and more recent literature. The species appears to be related on the one hand to *Biduanda thesmia* (Hew.), on the other to *Biduanda lavitsoni* (Druce.), judging at least by the pattern of the wings on the underside. If ever the phylogeny of the *Lycanidæ* comes to be traced, the wing patterns on the underside must carefully be taken into consideration; from a study of these, extending over three years, I have come to the conclusion that the more highly organised the butterfly, the more the underside wing-pattern tends to disappear from the discs of the wings and concentrate at the margins and at the anal angle of the hind-wing, in some cases disappearing even from these areas, as for example in Bornean examples of *Loxura atymmus.* A reason for this concentration of wing-pattern may perhaps be sought in the following considerations:—the typical *Lycænid* wing-pattern on the underside is that presented by such genera as *Nacaduba*, *Lampides*, *Cyaniris*, *Catachrysops*, consisting of catenulated bands or bands and spots crossing the discs of the wings in a more or less definite manner, at the anal angle of the hindwing is almost invariably present a conspicuous eye-spot; this eye-spot is supposed (and there is evidence to justify the supposition) to direct the attacks of enemies such as birds or lizards to a non-vital part of the body, the eye-spot being highly conspicuous when the butterfly is at rest (the bright patches of colour at the tips of the forewings of soberly coloured butterflies of other families is supposed to serve the same purpose; cf. also the Orange Tip of Europe). Now if the pattern disappears from the discs of the wings, this eye-spot, which by the way may degenerate into a mere patch or streak of bright colour, becomes still more conspicuous and consequently of greater value to the butterfly, whilst the risk of the main body of the wings proving a source of attraction to enemies is now much lessened, seeing that they are unornamented: in *Loxura atymnus* the absence of eye-spot is compensated for by the long tails into which the hind wings are drawn out. The axiom then with which this short dessertation commenced that the more highly organised the *Lycænid* the more the underside wing-pattern concentrates outwardly, seems to follow naturally on the more general axiom, that the more highly organised the animal, the more diverse and complete are its methods of defence. The species under notice is of interest as affording a glimpse of the manner in which the diffuse wing-pattern of *Biduanda thesmia* (Hew.) may become outwardly concentrated as in *B. hewitsoni* (Druce).

Fam. *Pieridæ*. Sub. fam. *Pierinæ*.

(38) *Delias eumolpe* (Grose Smith).

♀ *upperside* Black. *Forewing* with a large white oblique spot closing the cell and extending somewhat above and below it; *Hindwing* with a large discal area whitish dusted with ochreous and black scales. *Underside*, *Forewing*, black, cell-spot as above. A marginal row of spots, the upper yellow and the larger, the lower white, the last being bifid. *Hindwing* as in male but the discal yellow area much reduced. Expanse 88mm.

This sex is described here for the first time. The species which was originally described from Kina Balu is not mentioned by Dr. Butler in his recent revision of the genus Delias (Ann. Mag. N. H 16. vol. 20., Aug. 1897).

(39) *Delias Singhapura* (Wall).

(40) *Delias cathara* (Grose Smith). Exactly mimicked by a *Chalcosiid* moth. *Mimeuplœa pieroides* Wlk.

(41) *Delias parthenia* Staud. Previously recorded from Kina Balu.

(42) *Terias hecabe* (L.) Common everywhere.

(43) *Catophaga (Hyposcritia) plana* (Butl).

(44) *Catophaga* (*Tachyris*) *cardena* (Hew).

(45) *Huphina hespera* (Butl.) This form has recently been separated from H. lea (Doubl.)

Sub. fam. *Papilioninæ.*

(46) *Troides brookianus* (Wall.)

(47) *Troides helena cerberus* (Feld.)

(48) *Papilio demolion* (Cr.)

(49) *Papilio nephelus saturnus* (Gir.)

(50) *Papilio paradoxus telesides* (Feld.)

(51) *Papilio arpina carnatus* (Rothschild and Ford).

Fam. *Hesperidae..*

(52) *Tagiades waterstradti* (Elwes).

(53) *Telicota bambusae* (Moore).

(54) *Notocrypta feisthamelii* (Boisd.)

(55) *Parnara moolata* (Moore).

(56) *Hasora chabrona* (Plötz).

Table of Species of Butterflies Occurring on Mounts Matang, Santubong and Penrissen.

	Matang.	Santubong	Penrissen
Nymphalidæ-Danainæ.			
Hestia lynceus, Drury	—	—	—
Tirumala septentrionis, Butl.	—		
Parantica crowleyi, Jenner-Weir			—
Caduga larissa, Feld.			—
Adigama scudderi, Butl.	—		
Penoa menetriesii, Feld.	—	—	
Trepsichrois mulciber, Cr.	—	—	—
Danisepa lowi, Butl.		—	—
Salpinx leucostictos, Gm.	—		
Isamia ægyptus, Butl.	—		
Satyrinæ.			
Satoa maianeas, Hew.			—
Neorina lowi, D. & H.	—		
Ypthima pandocus, Moore	—	—	—
Amnosia baluana, Fruhst.	—		
Elymniinæ.			
Elymnias aroa sp. n.			—
,, lais, Cr.	—	—	—
Amathusiinæ.			
Thaumantis odana, Godt.			—
,, aliris, Westw.	—		
Clerome stomphax, Westw.	—	—	
Xanthotænia busiris, Westw.	—	—	
Nymphalinæ.			
Euripus halitherses, D. & H.	—		
Cupha erymanthis, Drury			—

	Matang	Santubong	Penrissen
Atella alcippe, Cr.			
,, sinha, Kollar.	—		—
Terinos clarissa, Boisd.			—
Cynthia deione, Erichs	—	—	—
Neptis dindinga, Butl.	—	—	
,, miah, Moore	—		
,, anjana, Moore	—		
Cirrochroa malaya, Feld.	—		
,, orissa, Fab.	—		
Stibochiona persephone, Staud.	—		
Pandita sinope, Moore	—	—	
Limenitis daraxa, D. & H.	—		
,, procris, Cr.		—	—
Euthalia vacillaria, Butl.	—		
,, ambalika, Moore	—		—
,, ? magnolia, Staud.	—		
,, lavernalis, de N.		—	
,, merta, Moore	—		
,, garuda, Moore	—		
,, adonia, Cr.	—		
,, whiteheadi, G. Smith	—		—
Tanæcia ellida, Staud.		—	
,, valmikis, Feld.	—	—	
,, lutala, Moore		—	
Athyma abiasa, Moore	—	—	—
,, euloca, sp. n.	—		
,, nefte, Cr.	—		
,, amhara, Druce	—		
Symphædra dirtea, Fab.			—
Symbrenthia hypatia	—		—
var. hippocrene, Staud			
Cyrestis seminigra, G. Smith			—
,, rahria, Moore	—	—	
Eulepis jalysus, Feld.		—	
Charaxes distanti, Honr.	—		

	Matang	Santubong	Penrissen
Lemoniidæ.			
Zemeros albipunctata, Butl. ...			—
„ emesioides, Feld. ...	—	—	
Dodona elvira, Staud. ...	—		
„ deodata, Hew. ...		—	
Abisara kausambi, Feld. ...	—		
„ savitri, Feld. ...	—		
Lycænidæ.			
Paragerydus pyxus de, N. ...	—		
„ contestus sp. n. ...	—		
Allotinus subviolaceus, Feld. ...	—		
Logania staudingeri, Druce ...	—		
Cyaniriodes libna, Hew. ...	—		
Simiskina pharyge, Hew. ...	—		
Neopithecops zalmora, Butl. ...	—		—
Cyaniris puspa, Horsf. ...		—	—
„ placida, Moore ...	—		—
„ placidula, Druce ...	—		—
„ ? transpectus, Moore ...	—		
„ lugra, Druce ...	—	—	
„ selma, Druce ...			—
„ strophis, Druce ...			—
„ plauta, Druce ...			—
„ haraldus, Feld. ...	—		
Lycenæsthes lycænina, Feld. ...	—		
„ emolus, Godt. ...		—	
Luthrodes mindora, Feld. ...	—		
Nacaduba pavana, Horsf. ...	—	—	
„ sp.			—
„ hermus, Feld. ...		—	
„ ardates, Moore ...	—	—	
„ atratus, Horsf. ...	—	—	
„ berœ, Feld. ...		—	
„ ? ancyra, Feld. ...		—	
Lampides coruscans, Moore ...	—		

	Matang	Santubong	Penrissen
Castalius ethion, D. & H.	—		
Iraota rochana, Horsf.	—	—	
,, nila, Dist.	—	—	
Arhopala centaurus, Fab.	—		
,, borneensis. Druce		—	
,, fulgida, Hew.	—	—	
,, similis, Druce			—
,, capeta, Hew.		—	
Curetis malayica, Feld.		—	
Dacalana vidura, Horsf.	—	—	
Pratapa lucidus, Druce	—		
,, devana, Druce	—	—	
,, calculis, Druce	—	—	
Aphnæus lohita, Horsf.	—		
Tajuria mantra, Feld.		—	
,, isaeus, Hew.			—
,, donatana de, N.	—	—	
,, travana, Hew.	—		
Britomartis sp.		—	
Purlisa giganteus, Dist.	—		
Chliaria skapane, Druce	—		
,, minima, Druce	—		
Mantoides licinius, Druce		—	
Neocheritra amrita var. theodora, Druce		—	
Horaga corniculum, Druce	—		
Semanga superba, Druce	—		
Biduanda sp.			—
Drina maneia, Hew.	—		
Lehera anna, Druce	—	—	
Araotes lapithis, Moore		—	
Deudorix epijarbas, Moore	—	—	
,, staudingeri, Druce		—	
,, strephanus, Druce	—	—	
,, diara, Swinh.	—		
Rapala abnormis, Elwes	—	—	

	Matang	Santubong	Penrissen
Bindahara phocides, Fab. ...		—	
Virachola smilis Hew. ...	—	—	
Liphyra crassolis Westw. ...	—		
Fam. Papilionidæ			
Sub. fam. Pierinæ			
Delias metarete, Butl. ...	—	—	
„ singhapura, Wall. ...	—	—	—
„ cathara, G. Smith ...			—
„ parthenope, Wall. ...		—	
„ parthenia, Staud. ...			—
„ hermione sp. n. ...	—		
„ eumolpe, G. Smith ...			—
Prioneris vollenhovii, Wall. ...	—		
„ cornelia, Vollenh. ...	—		
Terias nicobariensis, Feld. ...	—	—	—
„ sari, Horsf. ...	—		
Dercas gobrias, Hew. ...	—	—	
Catophaga plana, Butl. ...	—	—	—
„ distanti, Butl. ...	—		
„ cardena, Hew. ...	—	—	
Huphina hespera, Butl. ...	—	—	—
Sub. fam. Papilioninæ ...			
Troides brookianus, Wall. ...			—
Troides helena cerberus, Feld. ...	—		—
„ amphrysus flavicollis Druce ab. ruficollis ...		—	
Papilio demolion, Cr. ...			—
„ helenus palawanicus, Staud.		—	
„ iswara, White ...	—	—	
„ fuscus prexaspes, Feld. ...		—	
„ slateri hewitsonii, Westw.	—		
„ paradoxus telesicles, Feld.	—		—
„ caunus mendax, Rothsch.	—		
„ arjuna carnatus, Rothsch.	—	—	—

	Matang	Santubong	Penrissen
Papilio nephelus saturnus, Guer.			—
,, payeni brunei, Fruhst. ...	—		
,, bathycles bathycloides, Honr. ...	—		
,, macareus macaristeus, G. Smith. ...	—		
,, sarpedon L. ...		—	
,, agamemnon L. ...		—	
Fam. Hesperidae.			
Charmion ficulnea, Hew. ...	—		
Odina hieroglyphica, Butl. ...	—		
Tagiades waterstradti, Elwes. ...	—	—	—
Koruthaialos hector, Wats. ...	—		
Gangara thyrsis, Fab. ...	—		
Plastingia fruhstorferi, Mab. ...	—		
Notocrypta feisthamelii, Boisd...			—
Telicota augias L. ...	—	—	
,, bambusæ, Moore ...	—	—	—
,, palmarum, Moore ...	—		
,, dara, Kollar ...		—	
Halpe zema, Hew.	—		
Parnara moolata, Moore ...			—
,, guttatus, Brem. & Grey	—		
,, contigua, Mab. ...		—	
Hasora chabrona, Plotz. ...	—	—	—
Hasora borneensis, Elwes ...	—		
,, chuza, Hew.		—	
Badamia exclamationis, Fab. ...	—		
Rhopalocampta crawfurdi, Dist...	—		

A List of the Reptiles of Borneo.

By R. Shelford, B.A. (*Cantab.*)
Curator, Sarawak Museum.

The following purports to be nothing more than a mere list of the reptiles recorded as occurring in Borneo to date December, 1900. Doubtless a few species still await discovery, seeing that so recently as March 1899, Dr. R. Hanitsch found on that well-explored mountain, Kina Balu, a new gecko and two new snakes, and that the collections made by Mr. E. A. W. Cox and myself on Mount Penrissen in the same month contained also a new lizard* (*Lygosoma Shelfordi* Blgr.); nevertheless the herpetological fauna of the island may fairly be described as being well-known, thanks largely to the admirable collections formed in past years by the late Mr. A. H. Everett, the late Mr. John Whitehead and by Dr. C. Hose, and the time appears ripe, even if the need is not very pressing (though I have seen no list pretending to such completeness as this since the publication of Mocquard's *Recherches sur la faune herpetologique des isles de Borneo et de Palawan* in the Nouvelles Archives du Muséum 1890) for the production of such a list as this.

I have not included the reptiles occurring in those zoogeograpical dependencies of Borneo, the islands of the Natuna and Palawan groups, as lists of these may be found in the *Novitates Zoologicæ* and Annals and Magazine of Natural History.

References to the literature treating of the various species have been reduced as far as possible. I have given as a rule merely a reference to the British Museum Catalogues or to the earliest published description of the species.

In those cases where I have found that the colours of living or newly dead specimens differ markedly from the published descriptions, compiled apparently from faded spirit specimens, I have written short notes correcting the errors. No attempt at field notes has been made.

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* The new snakes described by Mr. Boulenger in the same paper together with this lizard had been stored in the Sarawak Museum for several years, unidentified. One,—Amblycephalus nuchalis—was rediscovered a few weeks ago.

In a list of such local interest as this, it is necessary that more detailed localities be quoted than merely Borneo or Sarawak—though these are quoted when no other can be given—and some attention has been paid to this point; on the other hand I have not considered it worth while to give a long list of the localities in which such common species as *Geomyda spinosa*, *Gecko monarchus*, *Coluber melanurus*, etc., etc., may be obtained, but have contented myself with remarking that the species is widely distributed throughout the island. For the benefit of those unfamiliar with the geography of Borneo, the following details of the position of the localities quoted below may be useful :—

Sarawak River, Samarahan R., Sadong R., Batang Lupar R., Saribas R., Baram R., Limbang R., Trusan R., are main rivers of Sarawak taken in order as one proceeds N. E. Kuching (the capital of Sarawak), Paku, Bau, Busau, Braang, Pankalan Ampat are on the Sarawak river or its tributaries, the two latter are near the foot of Mt. Penrissen. Matang is a mountain 7 miles distant from Kuching; Santubong is a mountain at the mouth of the Sarawak river, a village of the same name lying at its foot. Buntal is near the mouth of the same river. Simanggang is on the Batang Lupar R. Sibu, Kapit and Belaga are government stations on the Rejang River. Oya is on the sea-coast between the Rejang and Baram. Niah is at the mouth of the Baram; Dulit, Batu Song and the Pamabo range, mountains in its head-waters. The Padas river is in the territory of British N. Borneo, it debouches on the N. coast. Mt. Kina Balu, Bandjermassin, Koti, Labuan and Sandakan may be found on any map of Borneo. Telang, Sinkawang, Barabei and Tanjong are in S. W. Borneo (Dutch), Sintang is near Pontianak. Sebroeang is an affluent of the Kapuas, N E. of Sintang.

Of the 87 genera enumerated here, 6 are peculiar to Borneo, viz.—

Chelonians, Brookeia.
Lizards, Lanthanotus.
Snakes, Hydrablabes,
Lepturophis,
Oreocalamus,
Idiopholis.

Of the 212 species, the following, 64 in number, are peculiar to the island.

Chelonians. Bellia borneensis. Brookeia baileyi.

Lizards. Gymnodactylus baluensis. Aeluroscalabotes dorsalis. Gecko rhacophorus. Draco cornutus. D. obscurus. D. cristatellus. D. maximus. D. microlepis. Gonyocephalus doriæ. G. liogaster. G. miotympanum. Japalura nigrilabris. Lanthanotus borneensis. Varanus heteropholis. Lygosoma tenuiculum. L. shelfordi. (?) L. vittatum. L. nitens. L. parietale. L. whiteheadi. L. alfredi. Tropidophorus beccarii. T. brookii.

Snakes. Stoliczkaia borneensis. Tropidonotus conspicillatus. T. petersii. T. sarawacensis. T. flavifrons. Opisthotropis typica. Hydrables periops. H. præfrontalis. Xylophis albonuchalis. Lepturophis borneensis. Xenelaphis ellipsifer. Simotes subcarinatus. Simotes annulifer. Oreocalamus hanitschi. Idiopholis collaris. Calamaria baluensis. C. grabowskii. C. prakkii. C. bicolor. C. lateralis. C. brookii. C. brachyura. C. hosei. C. beccarii. C. rebentischii. C. schlegelii. C. borneensis. C. benjaminsii. C. melanota. C. lovii. C. gracillima. C. picteti. Hypsirhina alternans. H. doriæ. Dipsadomorphus nigriceps. Hydrophis brookii. Distira sarawacensis. Amblycephalus nuchalis. Lachesis borneensis.

The initials S. M. signify that the species is represented in the Sarawak Museum collection.

Reptilia.

ORDER EMYDOSAURIA.

Fam. *Crocodilidæ.*

Genus *Tomistoma.*

Tomistoma schlegelii (S. Müll.): Blgr. Cat. Chel. B. M. p. 276.
Sadong R., Sarawak, Muka, N. Borneo. S. M.

Genus *Crocodilus.*

Crocodilus porosus (Schneid.): Blgr. l. c. p. 284.
Occurs in every river in Borneo. S. M.

ORDER CHELONIA.

Suborder *Thecophora*, Super. Fam. *A. Trionychoidea.*

Fam. *Trionychidæ.*

Genus *Trionyx.*

Trionyx subplanus (Geoffr.): Blgr. Cat. Chel. B. M. p. 246.
Kuching. S. M.

Trionyx hurum (Gray): Blgr. l.c. p. 249.
Santubong. S. M.

Trionyx cartilagineus (Bodd.): Blgr. l.c. p. 253.
Kuching, Bau, Limbang, Baram (Hose), Sebrœang (Chaper). S. M.

Genus *Pelochelys.*

Pelochelys cantoris (Gray): Blgr. l. c. p. 263.
Koti (Carl Bock).

Super. Fam. *B. Cryptodira*, Fam. *Testudinidae.*

Genus *Testudo.*

Testudo emys (Schleg. & Müll.): Blgr. l.c. p. 158.
Simanggang (H.H. the Rajah). Batang Lupar. S. M.

Genus *Geomyda.*

Geomyda spinosa (Gray): Blgr. l.c. p. 137.
An extremely common and widespread species. S. M.

Genus *Nicoria.*

Nicoria spengleri (Gmel.): Blgr. l.c. p. 120.
Borneo.

Genus *Cyclemys.*

Cyclemys platynota (Gray): Blgr. l.c. p. 130.
Kuching. Limbang (Bartlett). S. M.

Cyclemys dhor (Gray): Blgr. l.c. p. 131.
Widely distributed and very common. S. M.

Cyclemys amboinensis (Daud): Blgr. l.c. p. 133.
Kuching. S. M.

Genus *Bellia.*

Bellia crassicollis (Gray): Blgr. l.c. p. 98.
Borneo (Dillwyn).

Bellia borneensis (Gray): Blgr. l.c. p. 100.
Sintang (Bleeker).

Genus *Callagur.*

Callagur picta (Gray): Blgr. l.c. p. 60.
Kuching. Buntal. Oya. Baram (Hose). S. M.

Genus *Kachuga.*

Kachuga trivittata (D. & B.): Blgr. l.c. p. 55.
Kuching.

Genus *Brookeia.*

Brookeia baileyi (Bartlett). S. M.
The literature relating to this species is as follows:—

Hardella baileyi, Bartlett. Sarawak Gaz. vol. XXV, p. 83, (1895).

Hardella baileyi, Bartlett. Zoolog. Note Book of Sarawak No. 1, p. 60. (1895.)

Brookeia baileyi, Bartlett. Sarawak Gaz. vol. XXVII, p. 113, (1895).

Brookeia baileyi, Bartlett. Zoolog. Note Book of Sarawak No. 2, p. 81. (1896).

Liemys inornata, Blgr. Ann. Mag. N.H. (6) vol. 19, p. 468-469.

Lobok Antu district, Batang Lupar river (D. J. S. Bailey, Esq.) Type in Sarawak Museum.

Family *Chelonidæ.*

Genus *Chelone.*

Chelone mydas (L): Blgr. Cat. Chel. B.M. l.c. p. 180.
Bornean seas. S. M.

Chelone imbricata (L): Blgr. l.c. p. 183.
Bornean seas. S. M.

Genus *Thalassochelys*.

Thalassochelys caretta (Linn.): Blgr. l.c. p. 184. Borneo (Bleeker).

Suborder *Athecae*. Fam. *Sphargidae*.

Genus *Dermochelys*.

Dermochelys coriacea (Linn.): Blgr. l.c. p. 10.

This species probably occurs in these waters though I have seen no record of its capture.

ORDER SQUAMATA.

Suborder LACERTILIA.

Family *Geckonidæ*.

Genus *Gymnodactylus*.

Gymnodactylus marmoratus (Kuhl.): Blgr. Cat. Lizards B. M. I, p. 44.

Mt. Kina Balu (Hanitsch). Mt. Dulit (Hose). Mt. Penrissen (Shelford). Kuching (Shelford). Mt. Matang. Sebroeang valley (Chaper). S. M.

Gymnodactylus consobrinus (Peters): Blgr. l.c. p. 47.
Matang. Mt. Santubong. Kuching (Shelford). Belaga (Hon. C. A. Bampfylde). S. M.

Gymnodactylus baluensis (Mocq.): Mocquard. Nouvelles Archives du Muséum. (3). II, p. 125. Pl. vii, fig. 1, a.b.c. Kina Balu (Whitehead).

Genus *Gonatodes*.

Gonatodes kendalli (Gray): Blgr. Cat. Liz. B. M. I. p. 63, Pl. v, f. 4.
Matang. Santubong. Kuching. Simatan (Shelford, Bartlett).

Gonatodes affinis (Stol.): Stol. Journ. As. Soc. Beng. xxxix. 1870, p. 167, Pl. x, f. 1.
Gonatodes penangensis. S. Flower. P. Z. S. 1896, p. 863, Pl. xliv. f. 1.
Mt. Penrissen 3000′ (Shelford and Cox). The species is now recorded for the first time from Borneo. S. M.

Colours of Bornean examples. Coal black with minute yellow spots on the back, tip of tail yellow. This is very different from the colouration of Malay Peninsula specimens.

Genus *Aeluroscalabotes.*

Aeluroscalabotes felinus (Günth.): Blgr. Cat. Liz., B. M. I. p. 73. Pl. iii, f. 8.
Pankalan ampat (Haviland). Penrissen (Shelford). Kuching, Saribas. S. M.

Aeluroscalabotes dorsalis (Peters): Blgr. l.c. p. 74.
Sarawak. (Doria and Beccari).

Genus *Hemidactylus.*

Hemidactylus frenatus (Schleg.): Blgr. l.c. p. 120.
Widely distributed throughout the island. S. M.

Hemidactylus platyurus (Schneid.): Blgr. l.c. p. 143.
N. Borneo (Whitehead, Hanitsch). Kuching (Bartlett). S. M.

Hemidactylus brookii (Gray): Blgr. l.c. p. 128.
Very doubtfully included in the Bornean fauna.

Genus *Mimetozoon.*

Mimetozoon craspedotus (Mocq.): Mocquard Le Natur 1890. p. 144.
Mimetozoon floweri Blgr. P. Z. S. 1896, p. 767, Pl. xxxvi.
N Borneo (Whitehead). Kuching (Shelford). S. M.

Genus *Gehyra.*

Gehyra mutilata (Wiegm.): Blgr. Cat. Liz. B. M. I. p. 148.
Widely distributed. S. M.

Genus *Lepidodactylus.*

Lepidodactylus ceylonensis. (Blgr): Blgr. l.c. p. 164, Pl. xiii, f. 3.

Lepidodactylus aurantiacus. (Bedd.): Blgr. l.c. p. 164, Pl. xiii, f. 3.
The Sarawak Museum has a young specimen from Santubong which I rather doubtfully refer to this species. S. M.

Lepidodactylus lugubris (D. & B.): Blgr. l.c. p. 165.
Bintang (Bleeker).

Genus *Gecko.*

Gecko stentor (Cantor): Blgr. l.c. p. 184.
Widely distributed throughout the island. S. M.

Gecko monarchus (Schleg.): Blgr. l.c. p. 187.
Widely distrbuted. S. M.

Gecko verticillatus (Laur.): Blgr. l.c. p. 183.
Rejang (Hon. C. A. Bampfylde). S. M.

Gecko rhacophorus (Blgr.): Blgr. Ann. Mag. N. H. (7) Vol. iv (1899) p. 451.
Hanitsch: Journ. As. Soc. Straits Br. No. 34. 1900, p. 70 Pl. i, fig. i.
Kina Balu (Hanitsch). Type in Raffles Museum, Singapore.

Genus *Ptychozoon.*

Ptychozoon homalocephalum (Crev.): Blgr. Cat. Liz. B. M. I. p. 190.
Brang (Haviland). Pamabo range (Hose). Pankalan ampat (Shelford and Cox). Kuching. S. M.

Ptychzoon horsfieldii (Gray). Gray. Phil. Mag. (2) iii, p. 54.
F. Müller (Veth. Nat. Ges. Basel, 1892, p. 210).

Genus *Tarentola.*

Tarentola delalandii (D. & B.): Blgr. Cat. Liz. B. M. I. p. 199.
Very doubtfully included in the Bornean fauna.

Fam. *Agamidæ*.

Genus *Draco*.

Draco volans (L.): Blgr. l.c. p. 256.
Almost universally distributed throughout Borneo. S. M.

Draco cornutus (Günth.): Blgr. l.c. p. 258, Pl. xx, f. 4.
Kiou, N. Borneo (Hanitsch). Kina Balu (Whitehead). Pamabo range (Hose). Matang, Santubong Kuching
S. M.

Colours, above dark green, mottled with paler green, outer half of wing membrane crimson; belly blue; basal two-thirds of gular appendage of male salmon pink.

Draco rostratus (Günth.): Blgr. l.c. p. 261.
Doubtfully included in the Bornean fauna.

Draco funbriatus (Kuhl.): Blgr. l.c. p. 265.
Matang (Bartlett). Pamabo range (Hose). S. M.

Draco obscurus (Blgr.): Blgr. A. M. N. H. (5) 1887, Vol. xx, p. 95.

Draco cristatellus (Gunth.): Blgr. Cat. Liz. B. M. I. p. 266.
Banting. Kuching (Bartlett). S. M.

Draco hæmatopogon (Gray): Blgr. l.c. p. 267.
N. Borneo (Whitehead). Sarawak. S. M.

Draco tæniopterus (Gunth.): Blgr. l.c. p. 269.
Matang. S. M.

Draco quinquefasciatus (Gray): Blgr. l.c. p. 269, Pl. xx, f. 8.
As widely distributed as D. volans. S. M.

Draco melanopogon (Blgr.): Blgr. Cat. Liz. B. M. iii, p. 492.
Another extremely common species. S. M.

Draco maximus (Blgr.): Blgr. P. Z. S. 1893, Pl. xxii, f. 1.
Mt. Dulit (Hose). Mts. Matang and Penrissen (Shelford).
S. M.

Draco microlepis (Blgr.): Blgr. P. Z. S. 1893, Pl. xcii, f. 2.
Merabah, N. Borneo (Everett).

Genus *Aphaniotis.*

Aphaniotis fusca (Peters): Blgr. Cat. Liz. B. M. I. p. 274.
Santubong (Shelford). S. M.

Genus *Gonyocephalus.*

Gonyocephalus doriæ (Peters): Blgr. l.c. p. 284.
Mt. Buri, Sadong River. S. M.

Gonyocepalus liogaster (Günth.): Blgr. l.c. p. 286.
Kuching, Santubong, Samarahan. S. M.

Gonyocephalus miotympanum (Günth.): l.c. p. 287.
N. Borneo (Whitehead). Labuan (Dillwyn).

Gonyoephalus borneensis (Schleg.): Blgr. l.c. p. 288.
N. Borneo (Whitehead).

Gonyocephalus grandis (Gray): Blgr. l.c. p. 298.
Mt. Dulit (Hose). Pankalan ampat (Haviland). Simanggang, Kuching. S. M.

Gonyocephalus tuberculatus (Günth.): Blgr. l.c. p. 291.
Santubong. (Shelford). S. M.

Genus *Japalura.*

Japalura nigrilabris (Peters): Blgr. l.c. p. 311.
Kina Balu (Whitehead and R. Hanitsch). Penrissen, Matang, Santubong, Kuching (Shelford). S. M.

Genus *Calotes.*

Calotes cristatellus (Kuhl.): Blgr. l.c. p. 316.
Universally distributed throughout the low-country. S. M.

Fam. *Helodermatidæ.*

Genus *Lanthanotus.*

Lanthanotus borneensis (Steind.): Blgr. Cat. Liz. B. M. II, p. 302.
Blgr. P. Z. S. 1899, p. 596.
One example is in the Sarawak Museum from the Plagus Rapids, Rejang River, collected by the Hon'ble C. A. Bampfylde. The type and only other known specimen is in the Vienna Museum. S. M

Fam. *Varanidæ.*

Genus *Varanus.*

Varanus heteropholis (Blgr.): Blgr. P. Z. S. 1892, p. 506, Pl. xxix.
Mt. Dulit (Hose). S. M.

Varanus dumerilii (Müller): Blgr. Cat. Liz. B. M. II, p. 312.
Baram (Hose). Pankalan ampat (Haviland). Kuching, Buntal. S. M.

Varanus rudicollis (Gray): Blgr. l.c. p. 313.
Baram (Hose). Pankalan ampat (Haviland). Matang, Kuching. S. M.

Varanus salvator (Laur.): Blgr. l.c. p. 314.
Dulit (Hose). Sebroeang (Chaper). Rejang R. (Hon. C. A. Bampfylde). Kuching, Santubong (Lewis). S. M.

Fam. *Lacertidæ.*

Genus. *Tachydromus.*

Tachydromus sexlineatus (Daud.): Blgr. Cat. Liz. B. M. III, p. 4.
Universally distributed throughout the low-country. S. M.

Fam. *Scincidæ.*

Genus *Mabuia.*

Mabuia rugifera (Stol.): Blgr. l.c. p. 184.
All these three species of Mabuia are abundant in every part of the island. S. M.

Mabuia multifasciata (Kuhl.): Blgr. l.c. p. 186. S. M.

Mabuia rudis (Blgr.): Blgr. l.c. p. 188. S. M.

Genus *Lygosoma.*

Sub.-Genus *Hinulia.*

Lygosoma tenuiculum (Mocq.) Nouv. Arch. Mus. (3) II, p. 133, Pl. viii, f. 2, Kina Balu (Whitehead).

Lygosoma variegatum (Peters): Blgr. Cat. Liz. III, p. 246.
Common everywhere. A variable species. S. M.

Lygosoma shelfordi (Blgr.): Blgr. P. Z. S. 1900, p. 182, Pl. xiv, f. 1. S. M.

Mt. Penrissen (Shelford). Type in Sarawak Museum.

Sub.-Genus *Keneuxia.*

Lygosoma olivaceum (Gray): Blgr. Cat. Liz. B. M. iii, p. 251. S. M.
Kina Balu (Whitehead). Kuching (Bartlett).

Lygosoma vittatum (Edel): Blgr. l.c. p. 252. S. M.
Common in all localities.

Sub.-Genus *Liolepisma.*

Lygosoma nitens (Peters): Blgr. l.c. p. 262. S. M.
Kuching.

Sub.-Genus *Emoa.*

Lygosoma parietale (Peters): Blgr. l.c. p. 299. S. M.
Common in many localities but chiefly near the coast.

Sub.-Genus *Riopa.*

Lygosoma bowringii (Günth.): Blgr. l.c. p. 308. S. M.
Kuching.

Lygosoma whiteheadi (Mocq.): Nouv. Arch. Mus. (3) ii, p. 134, Pl. viii, f. 3. (1890).
Kina Balu (J. Whitehead).

Lygosoma bampfyldei (Bartlett): Bartlett Journ. As. Soc. Straits Br. No. 26, p. 96. S. M.
Rejang River, (Hon. C. A. Bampfylde). Types in British Museum and in Sarawak Museum. The species has also been recorded from the Larut Hills, Perak.

The only published description is so inadequate that I append a more detailed diagnosis.

Body elongate, limbs very short: the distance between the end of the snout and the fore-limb is contained twice in the distance between the axilla and groin. Snout obtuse. Lower eyelid scaly. Supranasals present, in contact behind the rostral. Frontonasal much broader than long forming a crescentic suture with the frontal; præfrontals small; frontal in contact with the first and second supraoculars; four supraoculars; six supraciliaries; frontoparietals distinct: interparietal smaller; parietals forming a suture behind the interparietal; a pair of temporals border the parietals; nuchals not distinguishable. Seven upper labials; the first and second the largest; the fourth to sixth border the eye; ear opening small, round; three auricular lobules. Thirty-eight scales round the body. Dorsals smooth. Marginal preanals a little enlarged. The hind limb is contained two and a half times in the distance between the axilla and groin. Digits short, compressed; fourth toe a little longer than the third; 14 subdigital lamellæ beneath the fourth toe. Tail very thick, contained five times in the total length. Yellowish brown with a white band across the nape. Measurements in millimetres:— Total length 163, Head 20, Width of head 15.5, Body 109, Fore limb 20, Hind limb 29, Tail 32.

Lygosoma alfredi (Blgr).

Unfortunately I can give no reference to the literature relating to the species, nor any exact locality. Mr. A. H. Everett was the collector.

Genus *Tropidophorus*.

Tropidophorus beccarii (Peters): Blgr. Cat. Liz. B. M. p. 360.
Kina Balu (Whitehead). Matang (Beccari).

Tropidophorus brookii (Gray): Blgr. l.c. p. 361.

Dulit (Hose). Santubong (Bartlett). Pankalan ampat. Kuching (Shelford). Matang. S. M.

Suborder OPHIDIA.

Fam. *Typhlopidæ*.

Genus *Typhlops*.

Typhlops lineatus (Boie): Blgr. Cat. Snakes. B. M. I. p. 15.
Kuching. S. M.

Typhlops braminus (Daud): Blgr. l.c. p. 16.
Kuching. S. M.

Typhlops olivaceus (Gray): Blgr. l.c. p. 50. S. M.
Baram (Hose).

Fam. *Boidæ.*

Genus *Python.*

Python reticulatus (Schneid.): Blgr. l.c. p. 85.
Widely distributed. S. M.

Python curtus (Schleg.): Blgr. l.c. p. 89.
Kuching: Sibu (H. H. the Raja Muda). Telang S. E. Borneo (Grabowsky). S. M.

Fam. *Ilysiidæ.*

Genus *Cylindrophis.*

Cylindrophis rufus (Laur.) Blgr l.c. p.135.
A very common species. S. M.

Cylindrophis lineatus (Blanf.) Blgr. l.c. p. 137
Matang (Peake). Pankalan ampat (Shelford and Cox). Previously unrecorded from Borneo. The type is in the Singapore Museum. S. M.

Colors of living specimen. *Above.*—Black with irridescent sheen, head and tail red, and two longitudinal bands on each side of the middle line red. *Beneath.*—White blotched heavily with black, constituting from 30 to 35 irregular transverse bands; the under surface of the tail is immaculate white.

Fam. *Xenopeltidæ.*

Genus *Xenopeltis.*

Xenopeltis unicolor (Reinw.): Blgr. l.c. p. 168.
Kuching. S. M.

Fam. *Colubridæ.*

Series A. *Aglypha.*

Sub. Fam. i. *Acrochordinæ.*

Genus *Acrochordus.*

Acrochordus javanicus (Hornst.): Blgr. l.c. p. 173.
Sadong River (Bartlett). S. M.

Genus *Chersydrus.*

Chersydrus granulatus. (Schnied.): Blgr. l.c.p. 174.
Buntal (Haviland). S. M.

Genus *Stoliczkaia.*

Stoliczkaia borneensis (Blgr.): Blgr. A. M. N. H. (7) Vol. iv. p. 42. (1899). Kina Balu (Hanitsch).
Hanitsch. Journ. As. Soc. Str. Br. No. 34 (1900) Pl. j. f. 2.

Genus *Xenodermus.*

Xenodermus javanicus (Reinh.): Blgr. Cat, Snakes. B. M. I. p. 175.
Kuching (Shelford). Previously unrecorded from Borneo. S. M.

Sub. Fam. ii. *Colubrinae.*

Genus *Polyodontophis.*

Polyodontophis geminatus (Boie): Blgr. Cat. Snakes B. M. I. p. 185.
Kuching (Haviland and Bartlett). S. M.

Genus *Tropidonotus.*

Tropidonotus conspicillatus (Günth.): Blgr. l.c. p. 222.
Dulit (Hose). Tampassuk N. Borneo (Hanitsch). Kuching. Simanggang (H. H. the Raja Muda). Matang. S. M

Tropidonotus trianguligerus (Boie): Blgr. l.c. p. 224.
Oya. Kuching. Rejang River (Hon. C. A. Bampfylde). Telang and Lihong. Bahaja, S. E. Borneo (Grabowsky.) S. M.

Tropidonotus petersii (Blgr.): Blgr. l.c. p. 225.
Kuching. Saribas. S. M.

Tropidonotus piscator (Schneid.): Blgr. l.c. p. 230.
Borneo.

Tropidonotus stolatus (L.): Blgr. l.c. p. 253.
Doubtfully included in the Bornean fauna.

Tropidonotus chrysargus (Schleg.): Blgr. l.c. p. 258.
Dulit (Hose). Kuching (Bartlett). Rejang River (Brooke Low).

Tropidonotus maculatus (Edel): Blgr. l.c. p. 260.
Dulit (Hose). Kina Balu (Whitehead). Kuching. Limbang (Bartlett). S. M.

Tropidonotus saravacensis (Günth.): Blgr. l.c. p. 261.
Dulit (Hose). Kina Balu (Whitehead and Hanitsch). Matang. Kuching. S. M.

Tropidonotus flavifrons (Blgr): Blgr. l.c. p. 263.
Kina Balu (Whitehead and Hanitsch). Valley of Sebroeang (Chaper). S. M.

Genus *Macropisthodon.*

Macropisthodon flaviceps (D. and B.): Blgr. l.c. p. 266.
Valley of Sebroeang (Chaper). Kuching.
Skin of nape bright red. A black vertebral stripe edged anteriorly with white streaks. S. M.

Genus *Opisthotropis.*

Opisthotropis typica (Mocq.): Blgr. l.c. p. 285.
Kina Balu (Whitehead).

Genus *Hydrablabes.*

Hydrables periops (Günth.): Blgr. l.c. p. 296.
Matang.

Hydrables præfrontalis (Mocq.): Blgr. l.c. p. 297.
Kina Balu (Whitehead).

Genus *Xylophis.*

Xylophis albonuchalis (Günth.): Günth. A. M. N. H. (6) vol. 17, p. 229. (1896).
Baram (Hose).

Genus *Lycodon.*

Lycodon effrenis (Cantor): Blgr. Cat. Snakes. B. M. I. p. 356.
Sinkawang (Bleeker).

Lycodon subcinctus (Boie): Blgr. l. c. p. 359.
Kuching (Bishop Hose). S. M.

Lycodon albofuscus (D. and B.): Blgr. l.c. p. 357.
Kina Balu (Whitehead). Kuching. S. M.

Genus *Lepturophis*.

Lepturophis borneensis (Blgr.): Blgr. P. Z. S. 1900, p. 183, Pl xv.
Kuching. Type in the Sarawak Museum. S. M.

Genus *Dryocalamus*.

Dryocalamus tristrigatus (Günth.): Blgr. Cat. Snakes B. M. I. p. 372.
Kuching. S. M.

Genus *Zaocys*.

Zaocys carinatus (Günth.): Blgr. l.c. p. 377.
Valley of Sebroeang (Chaper). Kuching. S. M.

Zaocys fuscus (Günth.): Blgr. l.c. p. 378.
Kuching. Sibu (H. H. the Raja Muda). S. M.

Genus *Xenelaphis*.

Xenelaphis hexagonotus (Cantor.): Blgr. Cat. Snakes. B. M. ii, p. 8.
Valley of Sebroeang (Chaper). Kuching, Rejang R. (Brooke-Low). Baram (Hose). S. M.

Xenelaphis ellipsifer (Blgr.): Blgr. P. Z. S. 1900, p. 184, Pl xvi.
Type in the Sarawak Museum. Pankalan ampat. Caught in a Dyak fish-trap. S. M.

Genus *Coluber*.

Coluber tæniurus (Cope): Blgr. Cat. Snakes II. l.c. p. 47.
Braang, Sarawak River (Haviland). S. E. Borneo (Grabowsky.) S. M.

Coluber oxycephalus (Boie): Blgr. l.c. p. 56.
Kuching, Rejang River (Brooke-Low). Baram (Hose).
A specimen obtained near the mouth of the Trusan river amongst sandy scrub was bright ochreous in colour. S. M.

Coluber melanurus (Schleg.): Blgr. l.c. p. 60.
Widely distributed throughout Borneo. S. M.

Genus *Gonyophis.*

Gonyophis margaritatus (Peters): Blgr. l.c. p. 71.
Dulit (Hose). Kuching (Bartlett).
Colours of living specimen. Bright green, scales black, bordered throughout three-quarters of the total length, tail pale blue, seventeen yellow bands on the body: ventral shields yellow with black borders. S. M.

Genus *Dendrophis.*

Dendrophis pictus (Gmel.): Blgr. l.c. p. 78.
Very widely distributed. S. M.

Dendrophis formosus (Boie): Blgr. l.c. p. 84.
N. Borneo (Whitehead). Kuching. S. M.

Genus *Dendrelaphis.*

Dendrelaphis caudolineatus (Gray): Blgr. l.c. p. 89.
A very common species near Kuching. S. M.

Genus *Simotes.*

Simotes purpurascens (Schleg.): Blgr. l.c. p. 218.
Kuching. Saribas. Pankalan ampat (Haviland). Matang. Labuan (Dillwyn). S. M.

Simotes octolineatus (Schneid.): Blgr. l.c. p. 224.
A widely distributed species. S. M.

Simotes subcarinatus (Günth.): Blgr. l.c. p. 226.
Kuching. Matang (Shelford). S. M.
Colours of living examples dark olive above, head suffused with crimson, body with pinkish cross bands edged with black. Ventral surface crimson.

Simotes annulifer (Blgr.): Blgr. l.c. p. 226.
N. Borneo (Everett).

Genus *Oligodon.*

Oligodon everetti (Blgr.): Blgr. l.c. p. 239.
Kina Balu (Everett).

Oligodon vertebralis (Günth.): Blgr. l.c. p. 245.
Kina Balu (Whitehead). Banjermassin (Dillwyn).

Genus *Ablabes.*

Ablabes tricolor (Schleg.): Blgr. l.c. p. 281.
Matang. S. M.

Ablabes baliodirus (Boie): Blgr. l. c. p. 283.
Kina Balu (Whitehead). Pankalan ampat (Haviland). Kuching, Saribas, Baram (Hose). S. M.

Ablabes longicauda (Peters): Blgr. l.c. p. 284.
Batu Song (Hose). Rejang River (Brooke-Low). Busau. Baram (Hose). Matang. S. M.

Genus *Oreocalamus.*

Oreocalamus hanitschi (Blgr.): Blgr. A. M. N. H. (7) Vol. iv. (1899) p. 453.
Hanitsch, Journ. As. Soc. Str. Br. No. 34 (1900) p. Pl.
Kina Balu (Hanitsch). Type in Raffles Museum, Singapore.

Genus *Idiopholis.*

Idiopholis collaris (Mocq.) Blgr. Cat. Snakes B. M. II. p. 327.
Valley of Sebroeang (Chaper).

Genus *Pseudorhabdium.*

Pseudorhabdium longiceps (Cantor): Blgr. l.c. p. 329.
Pontianak (Peters), Kuching, Simanggang.
Colours of fresh specimen black, brilliantly irridescent, a narrow sealing-wax red collar and an oblique streak passing behind the eye from the last upper labial to the parietal, also red. S. M.

Genus *Calamaria.*

Calamaria vermiformis (D. & B.): Blgr. l.c. p. 333.
Kina Balu (Whitehead). Kuching, Batu Song (Hose). Matang. S. M.

Calamaria baluensis (Blgr.): Blgr. l.c. p. 335.
Kina Balu (Whitehead).

Calamaria grabowskii (Fisch.): Blgr. l.c. p. 335.
Kina Balu (Whitehead). S. E. Borneo (Grabowsky).

Calamaria prakii (v. Lidth de Jeude): Blgr. l.c. p. 337.
N. Borneo.

Calamaria everetti (Blgr.): Blgr. l.c. p. 340.
Sarawak (Everett). Pankalan ampat (Haviland). S. M.

Calamaria leucogaster (Bleek): Blgr. l.c. p. 341.
Kuching (Bartlett). Matang (Sands). Labuan (Everett).
Kina Balu (Everett). S. M.
Colours of fresh specimens. Above, irridescent brown with 8 longitudinal black stripes, broad transverse black band on nape; tail, red with 3 longitudinal black stripes and two transverse bars. *Beneath* bright red, except the chin and throat which are white, a black stripe on the sub-caudals may or may not be present.

Calamaria bicolor (D. & B.): Blgr. l.c. p. 342.
Kina Balu (Whitehead). Paku, Upper Sarawak. S. M.

Calamaria lateralis (Mocq.): l.c. p. 342.
Kina Balu (Whitehead).

Clamaria brookii (Blgr.): Blgr. Cat. Snakes B. M. III, p. 647.
Matang (H. H. the Rajah). S. M.

Calamaria brachyura (Blgr.): Blgr. l.c. p. 647.
Kina Balu (Everett).

Calamaria hosei (Günth.): Günth. A. M. N. H. (6) Vol. 17, p. 229. (1896). Entoyut river (Hose), Baram district.

Calamaria beccarii (Peters): Blgr. Cat. Snakes B.M. II p. 343.
Sarawak (Doria and Beccari).

Calamaria rebentischii (Bleek): Blgr. l.c. p. 343.
Sinkawang (Bleeker).

Calamaria agamensis (Bleek): Blgr l.c. p. 343.
Sinkawang (Bleeker).

Calamaria leucocephala (D. and B.): l.c. p. 344.
Kuching (Bishop Hose). Matang. S. M.
Belly red, the colour extending on to the sides of the tail; anterior part of the body paler.

Calamaria schlegelii (D. and B.) : Blgr. l.c. p. 345.
Borneo.

Calamaria borneensis (Bleek): Blgr. l.c. p. 347.
Sintang (Bleeker). Matang. Kuching (H. H. the Rajah). Simanggang. Baram (Hose). S. M.

Calamaria benjaminsii (Edel.): Blgr. l.c. p. 347.
Borneo.

Calamaria melanota (Jan.): Blgr. l.c. p. 349.
Tandjong. S. E. Borneo.

Calamaria lovii (Blgr.): Blgr. l.c. p. 350.
Rejang R. (Brooke Low). Niah (Hose). S. M.

Calamaria gracillima (Günth.): Blgr. l.c. p. 350.
Matang. Tegora. S. M.

Calamaria picteti (Perraca): Perraca. Revue Suisse Zool. vii, p. 325, Pl. xiv (1899).
Sarawak (Pictet and Bedot).

SERIES B. *Opisthoglypha.*

Sub. Fam. iii. *Homalopsinæ.*

Genus *Hypsirhina.*

Hypsirhina alternans (Reinw.): Blgr. Cat. Snake B. M. III, p. 4.
Kuching. S. M.

Hypsirhina plumbea (Boie): Blgr. l.c p. 5.
Labuan (Dillwyn).

Hypsirhina enhydris (Schneid.): Blgr. l.c. p. 6.
Simanggang. Saribus. S. M.

Hypsirhina punctata (Gray): Blgr. l.c. p. 12.
Sinkawang (Bleeker). Kuching. S. M.

Hypsirhina doriæ (Peters): Blgr. l.c. p. 13.
Sarawak (Everett). Kuching. S. M.

Genus *Homalopsis.*

Homalopsis buccata (L): Blgr. l.c. p. 14.
Pontianak and Sebraoeng (Chaper). Labuan (Dillwyn).

Genus *Cerberus.*

Cerberus rhynchops (Schneid.): Blgr. l.c. p. 16.
Sibu (Hon. C. A. Bampfylde). Kuching. Buntal. S. M.

Genus *Fordonia.*

Fordonia leucobalia (Schleg.): Blgr. l.c. p. 21.
Niah (Everett), Kuching. Santubong (Lewis). S. M.

Genus *Cantoria.*

Cantoria violacea: (Gunth.) Blgr. l.c. p. 23.
Borneo.

Sub. Fam iv. *Dipsadomorphinæ.*

Genus *Dipsadomorphus.*

Dipsadomorphus dendrophilus (Boie): Blgr. l.c. p. 70.
A widely distributed species. S. M.

Dipsadomorpus nigriceps (Gunth.): Blgr. l.c. p. 72.
Bongon, N. Borneo (Everett).

Dipsadomorphus jaspideus (D. & B.): Blgr. l.c. p. 73.
Labuan (Dillwyn). Kuching. Saribas Baram (Hose). Pankalan ampat (Haviland). S. M.

Dipsadomorphus drapiezii (Boie): Blgr. l.c. p. 74.
Kuching. Sandakan (Cator). Baram (Hose). Pankalan ampat (Haviland). S. M.

Dipsadomorphus cynodon (Boie): Blgr. l.c. p. 78.
Valley of Sebroeang (Chaper). Kuching, Rejang R. (Brooke-Low). Sandakan (Cator). S. M.

Psammodynastes pulverulentus (Boie): l.c. p. 173.
Valley of Sebroeang (Chaper). Kina Balu (Whitehead). Barabei, S.E. Borneo (Grabowsky)., Pankalan ampat (Haviland). S. M.

Psammodynastes pictus (Gunth.): Blgr. l.c. p. 174.
Dulit (Hose). Labuan (Dillwyn). Telang, S. E. Borneo (Grabowsky). Rejang River (Hon. C. A. Bampfylde). Kuching (Bartlett). S. M.

Genus *Dryophis.*

Dryophis prasinus (Boie): Blgr. l.c. p. 186.
A very variable species in colouration—green, brown, salmon coloured or speckled. Very widely distributed. S. M.

Dryophis fasciolatus (Fisch.): Blgr. l.c. p. 182.
S.E. Borneo, (Grabowsky). Baram (Hose). Kuching. S. M.

Genus *Dryophiops.*

Dryophiops rubescens (Gray.): Blgr. l.c. p. 194.
Sandakan (Cator). Sarawak (Doria and Beccari).

Genus *Chrysopelea.*

Chrysopelea ornata (Shaw): Blgr. l.c. p. 196.
Dulit (Hose). Labuan (Dillwyn). Braang (Haviland). Kuching, Rejang R. (Hon. C. A. Bampfylde), Pontianak (Chaper). Oya. S. M.

Chrysopelea chrysochlora (Reinw.): Blgr. l.c. p. 198.
Kuching (H. H. the Rajah). S. M.

SERIES C. *Proteroglypha.*

Sub. Fam. v. *Hydrophiinæ.*

Genus *Hydrus.*

Hydrus platurus (L): Blgr. l.c. p. 267.
Oya. S. M.

Genus *Hydrophis.*

Hydrophis gracilis (Shaw): Blgr. l.c. p. 280.
Borneo.

Hydrophis fasciatus (Schneid.): Blgr. l.c. p. 281.
Off coast of N. Borneo (Whitehead).

Hydrophis brookii (Gunth.): Blgr. l.c. p. 282.
Sarawak River. S. M.

Hydrophis obscurus (Daud): Blgr. l.c. p. 284.
Borneo.

Hydrophis floweri (Blgr.): P. Z. S. 1890, p. 106.
N. Borneo, (Flower).

Genus *Distira.*

Distira brugmansii (Boie): Blgr. Cat. Snake B.M. III, p. 292.
Muka (Capt. H. W. Peck). S. M.

Distira jerdonii (Gray): Blgr. l.c. p. 299.
Borneo.

Distira sarawacensis (Blgr.): Blgr. P. Z. S. 1900, p. 184, Pl. xiv, f. 2. Sarawak river: Type in Sarawak Museum. S. M.

Distira (?) *viperina* (Schmidt): Blgr. Cat. Snakes B. M. III, p. 298.
Oya (Cox). If correctly identified this is new to Borneo.
S. M.

Genus *Enhydris.*

Enhydris hardwickii (Gray): Blgr. l.c. p. 301.
Borneo (Sir E. Belcher). Santubong. S. M.

Genus *Enhydrina.*

Enhydrina valakadien (Boie): Blgr. l.c. p. 302.
Santubong. Sarawak River. Trusan River.
A specimen was captured at the mouth of the Sarawak river in February 1900, with several examples of a Cirripede allied to if not identical with *Dichelaspis pellucida* (Darwin) adhering to the scales. S. M.

Sub. Fam. vi. *Elapinae.*

Genus *Bungarus.*

Bungarus fasciatus (Schneid.): Blgr. l.c. p. 366.
Kuching; Baram (Hose). S. M.

Bungarus flaviceps (Reinh.): Blgr. l.c. p. 371.
Kina Balu (Everett). Kuching. Sibu (H.H. the Rajah Muda). Simanggang. S. M.

Genus *Naia.*

Naia tripudians (Merr): Blgr. l.c. p. 380.
Var *Miolepis.* Rejang river (Brooke-Low), Labuan (Dillwyn). Kina Balu (Everett), Kuching. Limbawang, lower Padas R. (Everett). Oya. S. M.

Var *paucisquamis.* Sarawak (Pictet and Bedot).

Naia bungarus (Schleg.): Blgr. l.c. p. 386.
Baram (C. Hose). Sibu (H. H. the Raja Muda). Pankalan ampat (Haviland). Kuching.
The young is very variable in colouration, an example recently captured at Sibu by H. H. the Raja Muda was marked almost exactly like *Bungarus bungaroides* (Cantor) but with an additional white band behind the eyes.

Genus *Doliophis*

Doliophis bivirgatus (Boie): Blgr. l.c. p. 400.
Sibu. Busau. Sintang (Bleeker). Matang. Bongon (Everett) Pontianak (Chaper) Kuching. Pankalan ampat (Haviland).

Doliophis intestinalis (Laur.): Blgr. l.c. p. 401
Dulit (Hose). Labuan (Collingwood). Matang. Tandjong. S. E. Borneo, Sintang (Bleeker). Kina Balu (Everett). Kuching, Simanggang. S. M.

Fam. *Amblycephalidæ.*

Genus *Haplopeltura.*

Haplopeltura boa (Boie): Blgr. l.c. p. 439.
Kuching. Baram (Hose). Saribas. Pankalan ampat (Haviland). S. M.

Genus *Amblycephalus.*

Amblycephalus lævis (Boie): Blgr. l.c. p. 441
Kina Balu (Everett) Pankalan ampat (Haviland). Kuching (Bartlett). S. M.

Amblycephalus malaccanus (Peters): Blgr. l.c. p. 442.
Dulit (Hose). Bongon (Everett).

Amblycephalus nuchalis (Blgr): Blgr. P. Z. S. 1900 p. 185 Pl. xvii. f. 1. S. M.
Matang. Saribas. Type in Sarawak Museum.

Fam. *Viperidæ.*

Sub. Fam. *Crotalinæ.*

Genus *Lachesis.*

Lachesis gramineus (Shaw): Blgr. Cat. Snakes. B. M. III, p. 554.
Dulit (Hose). Kina Balu (Whitehead). Pankalan ampat (Haviland). S. M.

Lachesis sumatranus (Raffl.): Blgr. l.c. p. 557.
Dulit (Hose).

Lachesis puniceus (Boie): Blgr. l.c. p. 560.
Borneo (Sir H. Low).

Lachesis borneensis (Peters): Blgr. l.c. p. 561.
Dulit (Hose). Matang. Pankalan ampat (H. H. the Rajah). Paitan, N. Borneo (Everett) and Baram. S. M.

Lachesis wagleri (Boie): Blgr. l.c. p. 562.
Widely distributed throughout the island. S. M.

Notes from the Sarawak Museum.

By R. Shelford.

On the Occurrence of the Mimetic Locustid *Condylodera tricondyloides* (West.) in Borneo.

This locustid which most closely mimics a large blue tiger-beetle, *Tricondyla sp.*, was originally discovered in Java and was described by Westwood in the Transactions of the Linnean Society, Vol. xviii, p. 409. The insect had so entirely deceived this renowned entomologist that it had been placed in the Hope collection of tiger-beetles *(Cicindelidæ)*, the mistake not being discovered for some time; subsequently another example was taken, in Java again, and was actually given the MS. name of *Tricondyla rufipes* by Duponchal. This specimen is also in the Hope collection, University Museum, Oxford. In Feb. 1900, my Dyak collectors brought in a locust which I immediately suspected to be the same species as that occuring in Java, and Dr. E. B. Poulton, F.R.S., to whom I have sent the specimen, informs me that if not the same species it is very closely allied; it is somewhat larger than the type. As the insect is undoubtedly very rare the following brief description of the colouration and external characters of a newly-killed example may be of some interest. The general colour is a dark blue of a shade identical with that of the *Tricondyla*; all the femora are bright red, the tibiæ and tarsi brown, again as in the model; the antennæ are long (two and one-half to three times the length of the body), and of an extreme tenuity and fragility; the head is extremely Cicindelid in form, with its prominent eyes and large mouth parts; the pronotum is elongate, somewhat constricted anteriorly and about its middle, the whole corresponding in length and shape to the prothorax and narrowed anterior third of the elytra of the tiger-beetle; the wing-rudiments are closely adpresed to the body and so do not break its smooth outline; the abdomen is slightly swollen; in the tiger-beetle the prothorax is smooth, the elytra strongly punctured, whilst in its mimic the pronotum is strongly punctured and the nervuration of the wing-rudiments gives also an impression of punctures. The locust seems to frequent old jungle and one example was found running about amongst dead and decaying vegetation, a situation in which the model is frequently met with. As might be expected from the comparatively small size of the hind femora the insect possesses but feeble leaping powers, appearing to trust rather to its turn of speed as a runner. Whether this is the adult stage or not is uncertain; the presence of wings would seemingly detract from the marvellously close mimicry, and one is inclined to suspect that they have secondarily become atrophied. In July another specimen differing in no wise from that just described was obtained, and also a very young example. This last was most interesting, since at this stage both body and legs were entirely dark blue and constituted a close mimic of a very small tiger-beetle of the genus *Collyris*, a flower-haunting species; the young locust was taken on the blossoms of a flowering tree, so that not only in colour but also in habits it differed markedly from the adult. Bearing in mind the mistakes made over this insect by such distinguished entomologists as Westwood and Duponchal, I made a careful search through our collection of Cicindelidæ, and was delighted to find in it yet another specimen of this very deceptive locust; this was intermediate in size between the youngest and the oldest stage known and mimicked another species of tiger-beetle (? Collyris sp.). Except in the matter of size there was little difference between this stage and the oldest stage, and I have naturally nothing to record of its habits.

I am unaware of any other example in the insect world affording a parallel case of mimicry; it is the general rule that a mimetic insect is mimetic at only one stage of its life history, or if at more than one, the models for the different stages are different; e.g., the larva of the hawk-moth Chaerocampa aurata, is remarkably snake-like, but the pupa is buried and the imago is protectively coloured; or again—the Mantis, Hymenopus bicornis is, when adult or when half-grown, a floral simulator, but the newly-hatched young mimic the newly-hatched young of an extremely common and highly distasteful bug, *Eulyes amœna.* The *Condylodera*, however, at all stages of its life history, so far as they are at present known, mimics a tiger-beetle; the models are, it is true, of different species, but a moment's reflection will shew that this is a necessity, for the young stages of an ametabolic insect such as this locust cannot mimic the corresponding stages (larva and pupa) of a holometabolic insect, such as the Tricondyla, which when adult serves as a model to the adult locust, without undergoing a series of modifications of structure that would completely alter the nature of the insect,—in short, the locust would no longer be a locust. The difficulty is obviated by the mimicking of different species of beetles, the model in each case corresponding in size to the mimic. It would be a matter of the greatest interest to discover the life histories of the Philippine grasshoppers *Scepastus pachyrhynchoides* and *Phoraspis sp.* which in their adult stages mimic respectively a weevil and a ladybird, sa these might afford parallel examples to the life history of Condylodera.

ON A COLOUR VARIETY OF *Coluber Oxycephalus* (BOIE).

This well-known snake is usually brilliant blue-green in colour, the tail alone being brown, but recently I obtained amongst sandy scrub fringing high-water mark near the mouth of the Trusan River an example with the head and body bright ochreous and the tail pale brown. Coloured in this manner the snake was, considering its size, very inconspicuous against its sandy background and it undoubtedly presented an example of adaptation to the colour of its surroundings such as may be met with in every desert area. The snake was preserved in formol and when examined next day was still quite ochreous. Three days later, however, the colour had reverted to the familiar blue-green; the preservative fluid was not discoloured so that the change must have been brought about, not by a dissolving out of pigment, but by some alteration of the shape or size of the pigment cells or chromatophores.

Mr. H. N. Ridley described in this Journal (No. 31, p. 89) an interesting colour variety of another species of this genus, *Coluber tæniurus* (Cope), from the Selangor caves; this variety was also protectively coloured but in adaptation to very different surroundings from those of the *C. oxycephalus* variety just described.

Garu and Chandan.

BY H. N. RIDLEY.

Incense woods have always been highly prized by Orientals from the earliest years, and a good deal has been written about them in various works, so that it is rather surprising to find how very incompletely the trees producing them are known. The two most important and interesting ones in the Malay Peninsula are the Garu or Calambac and the Chandan. Both of these belong to the genus *Aquilaria*, of the order *Thymeleaceæ* and as neither have been adequately described, I will give descriptions of the trees in dealing with each wood.

GARU OR GAHARU, KALAMBAK, TUIKARAS.

Aquilaria Malaccensis Lam. Dict. i.49. Ill. t. 356. Dec. Prodr. ii. 59. Kurz. For. Flor. ii. 336. Hook. fil Flor. British India v. p. 200. *A ovata* Cav. Diss. vii. 377. t. 224. *A secundaria* Dec. lc. Rumph. Herb. Amboin. ii 34 t. 10. A tree 70 to 80 feet tall with whitish rather smooth bark. Leaves elliptic acuminate glabrous when adult, sub-coriaceous thin 3 inches long 1½ wide, light green shining, nerves about 13 pairs not much raised beneath and quite invisible on the upper surface, young leaves and shoots silky. Flowers in short axillary silky panicles of umbels an inch long with two or three umbels of about 10 flowers on each, on slender pedicels ⅛ inch long, lobes 5 hairy oblong obtuse recurved, as long as the tube, alternate lobes smaller than the others. In the mouth of the tube and projecting conspicuously beyond it are ten oblong silky scales. Stamens 10, projecting beyond the tube, filaments free from the tube for some way, anthers obovate. Pistil cylindric hairy much shorter than the tube, tipped with a thick conic stigma. Fruit a flattened obovate woody capsule, green and fleshy when fresh, woody when dry, 1 inch long and ¾ inch wide, walls very thick, ¼ inch through, splitting into two valves with a partition down each, and containing one seed in each cell, Seed ovoid globose orange covered with red hair.

When the capsule splits the seed hangs out by a slender thread the funicle.

Occurs in dense forests in Singapore, Garden Jungle, Kranji. Johor. Malacca, Bukit Bruang, Sungei Hudang, Brisu. Negri Sembilan, Tampin, Bukit Sulu. Pahang, Kwala Luit. Penang Waterfall, Balik Pulau. Borneo, Labuk bay. Sumatra, near Kebang, Turabangi River, Lampongs. Banka near Jebus (Miquel in Flora of Sumatra).

The plant in the garden jungle produced remarkably small more rounded capsules ½ an inch long so that I at first took it to be a distinct species but as the leaves and flowers were absolutely identical I conclude it is but an abnormal form.

There seems to have been much confusion between this species and the Indian *Aquilaria Agallocha* Roxb. which is well figured by Roxburgh and Colebrook in the Transactions of the Linnean Society xxi t. 21. This tree certainly closely resembles our plant, but apparently attains a greater size ; the nerves of the leaf are more numerous ; the umbels of flowers are solitary and not panicled, and contain 20 to 40 flowers in each. The flowers are nearly twice as big, with ovate obtuse spreading lobes, the scales at the mouth shorter and not or only just projecting beyond the mouth, and five in number, the pistil is flask shaped with a distinct style narrower than the ovary and a large capitate stigma which reaches up to and fills the mouth of the tube. The capsule as figured much resembles that of the Malacca species, but is described as clavate turbinate and villous like a peach. Roxburgh states that capsules and young plants sent by Farquhar from Malacca in 1851 quite resemble those of the Indian species. Hooker, however, says that the figure of the fruit is quite like that of A. Malaccensis and very different from that of the Bhotan and Khasiya species, *A agallocha*, which he describes as oblanceolate acuminate thinly coriaceous and glabrous. However this may be it is clear I think that the Malacca plant is very distinct from the Indian one. The only figure of the flower of the Gaharu I have seen published is a very good one in Baillon's History of Plants, vol. vi, p. 108.

The valued drug is obtained from the centre of old trees, and the Malay garu hunters pretend to be able to see from the outward appearance of a tree whether or no it contains any. The greater number of trees do not. The ordinary wood of the tree is soft and white and seldom used for any purpose, but apparently from some injury or other certain trees are hollow and contain a certain quantity of the dark brown resinous wood with its peculiar odor. An account of the ceremonies used and the names of varieties of Garu was published by Mr. Bland in Journal No. 18 pages 359 to 361, which is quoted by Skeat in Malay Magic p. 206, with further additions and notes on the subject. Eight varieties are mentioned including the Chandan, which, however, is from a different tree and perhaps some of the others are not strictly speaking Garu, but it is admitted that there are several distinct varieties, of very different values. The early history of Garu is interesting although it cannot be certainly known to which of the two kinds the early records refer. It is always considered that the lign-aloes of the Bible, Ahalim, was Garu or Eagle wood, but the passages in which it was mentioned seem hardly to bear this out; thus Balaam refers to "the trees of the lign-aloes which the Lord hath planted," which if Garu he could have never seen, and though it is also referred to as being used for scenting the clothes and body in several passages, it does not appear as an ingredient in incense, for which it would be more likely to be used. The earliest definite mention of it appears to be by the Arab physician Abu Ali Al-hosain (commonly known as Avicenna), who lived from 980 to 1037. He mentions two kinds, Xylaloes and Agalugen. The first word Xylaloes is a Greek form of Lignum Aloes, which is a perversion of the Arabic Alud (literary the wood), which was modified into aloe wood and so Lignum Aloes. The first good account of the Garu is that by Garcia de Orta, who visited Malacca about 1534. He gives its name as Garo, and the best kind as Calambac, and states that it comes from Malacca and Sumatra whence it is brought by the Chinese, and is not as some persons supposed drifted down the rivers from paradise whence its old popular name paradise-wood. He obtained twigs and leaves from Malacca but was unable to get fruits or flowers on account of the difficulty and danger of daily observing the trees, because tigers frequently prowled about there. He states also that the natives of Malacca used to repurge the Garu before selling it, perhaps he found them adulterating it, as they do to this day. Mr. Bland's varieties are named Chandan, Tandok, Menjulong-ulong (Jenjolong in Selangor according to Skeat, is this Julong-Julong, *Agrostistachys longifolia* Benth?), Sikat, Sikat Lampam, Bulu Rusa, Kemandangan, Wangkang, to which Skeat adds Garu Isi Kang Tua, Garu Tutor, Garu Dedap, Garu Kundur, and Garu Akar. The last four of these are said by Skeat to be useless for market purposes and it may be doubted whether the six last in Bland's list are derived from any *Aquilaria* as the wood of most is described as whitish or yellow, fibrous and light. Perhaps the Garu Akar of Skeat's list is Getah Gaharu (*Willughbeia coriacea*). Chandan is a distinct tree but I have seen typical specimens of Garu called Chandan also. There are several other jungle trees which produce incense wood besides the Aquilarias, among them *Acronychia laurifolia (Rutaceæ)* the Mentua Keminiyan. The Garu tree is called by the Malays, Karas, Tuikaras, Tengkaras, Kakaras. Skeat also gives Tabak or, long Tabak as a name used by the Sakais and also as the Pantang Gharu word of the Pawangs. Pomet (Histoire des Drogues) gives also the word Tambac, as a name for the drug, which may be the same word.

The history of the popular names for the wood is curious. The earliest name is the Hebrew Ahalim, which is probably connected with the Agalukhi of the Arabs, whence Agallochon of the Greeks and Romans. Hence comes the name Agel wood, Eagle wood, the Portuguese Pao de Aquila, and the genus name Aquilaria. It was also called by the Arabs Ud (wood), or Alud, hence Aloe-wood, Lignaloes, which so confused the early druggists that they thought the Aloe-wood came from the plant which produced Aloes. Garu is from the Sanskrit Aquaru. Kalambak is the name commonly given by Malays to the best class of Garu. Rumph derives it from Kilam or Hokilam, the Chinese name for the tree, and Bac, which means knots or buds. Loureiro gives Chinhiam and Manhiam as Cochin-Chinese for the plant. Favre gives as connected words Halombak (Battak), a sort of wood of which they make beers, and Kalamba (Macassar), which is evidently a mere form of Kalambac. Miquel says it is called Halim in Sumatra. Another old name for Garu was Paradise wood, because it was supposed to be drifted down rivers from Paradise.

Rumph in the Herbarium vol. xi gives a long account of the Garus, with a figure of the Malacca plant. He distinguishes two, Agallochum primarium Calambac, and Agallochum secundarium Garo. The first was obtained from Tsjampoa (Chiampa) in Eastern Cochin China and Siam, where it is called Kilam or Hokilam. What the plant that produced this is uncertain, as no one of late years has procured any specimens of an Aquilaria from Cochin China or Siam. Loureiro in the Flora Cochin-Chinensis gives very insufficient descriptions of Aloexylum Agallochum, a plant of which he got some battered scraps from the highest mountains of Cochin China near the great river "Lavum" which flows between this kingdom and Laos, and of Ophispermum Sinense (evidently a species of Aquilaria) of which he does not give the locality. This region has been so little explored by botanists that it is not to be wondered that the plant whatever it is has not been recovered. Marco Polo also mentions that Ziamba (chiampa) abounds in lign-aloes of the Agallochum secundarium, or Garo. Rumph gives two forms Agallochum coinamense the Garo Cominyan (Gharu Kemeniyan) which comes from Malacca, the islands of Johore, Bintang, etc., and especially Billiton. There are three varieties Garo Capalla or Garo Tingelam; Garo Ramas or Tengga-Tengga and a cheaper kind, Garo Eckor, (is this last Skeat's Garu Akar?) The best kind is found in the region inhabited by the forest people "Bunoang" (Orang Benua). Around Malacca also he says is found a kind called Garu Masang (Musang) which inflames the eyes. This is probably the wood of Excoecaria Agallocha (Euphorbiaceae) which is a common poisonous sea-shore tree. It is perhaps noteworthy that Garu is not mentioned as being derived from India proper till comparatively late. Pomet mentions that it was sent to Europe from Calecut. Marco Polo states that Java minor (Sumatra) contains lign-aloes.

In very early days in Europe the Garu wood was used internally for colic according to Paul Aeginæta in 1531 and it is still used for the same complaint and for malaria by Tamils here. Rumph recommends it for strengthening the heart, stopping palpitations, oppression of the chest, and cardalgia. Pomet in the Histoire des Drogues published in 1694 says it has no use in medicine as far as he knows except that it is very aromatic

He gives a picture of the tree which bears no resemblance to anything in particular. Its greatest use has always been for fumigating and it is highly valued by Orientals for ceremonial purposes. Imitation gharu is often made and sold; pieces of decayed brown wood being scented with incense till they retain the smell long enough for selling purposes. In about a month the scent disappears. Rumph mentions this fraud. He says the wood is put into a pot with some shavings of Calambac and kept it closed for a month so that the smoke may not escape, and it will last scented for two or three months. The present value of good Garu is four hundred dollars a picul.

CHANDAN.

This tree I heard of as distinct from Garu some years ago but could not get any information about it. The name is absolutely the same as the Indian vernacular for sandalwood, *Santalum album*, but it was clear that this plant did not grow here. While on a botanic expedition in Batu Pahat this year I met with the plant on Bukit Pengaram in dense forest at an altitude of nearly 1000 feet. An old Malay who was with me commenced chopping at a small tree and on my inquiry why he did so he said it was a Chandan tree. There were no fruit or flowers on it but I obtained leaf specimens and portions of the inner wood which on being burnt gave out an aromatic odor somewhat like that of Garu, but distinct. The Malay said that the tree was not old enough to produce good Chandan, and that there was little to be met with in that part of Johor. From the foliage I identified it as an Aquilaria of which I had in the herbarium flowering specimens without locality, Kayu Chandan, by Murton, and fruiting ones collected by a plant collector at Kranji in Singapore. It is referred to in my list of Singapore plants as *A grandiflora* Benth., but on comparing the specimens with the description of that plant I conclude it is quite distinct and propose to call it *Aquilaria hirta* n. sp.

Description. A slender tree about 30 feet tall, and four inches through, with whitish rather smooth bark, $\frac{1}{8}$ inch thick. The shoots and young twigs covered with silky hairs. Leaves alternate 3 to 6 inches long $1\frac{1}{4}$ to $2\frac{1}{2}$ inches wide, elliptic or elliptic ovate acute, coriaceous with a thickened edge glabrous and very smooth above, beneath covered with hair especially on the midrib, nerves about 18 pairs almost or quite invisible above, petiole less than ¼ inch long hairy. Flowers in peduncled cymes axillary silky, peduncles ¼ inch long covered with silky hairs. Pedicels stout ¼ inch long, tube of the flower as long cylindrical, lobes five ovate much shorter than the tube, silky outside, a thickly silky ring in the mouth at the back of the stamens and barely longer than the mouth of the tube. Stamens ten, anthers oblong nearly sessile in the mouth of the tube, 2 celled apex below bifid, filaments adnate to the tube for their whole length, distinctly elevated hairy. Pistil oblong hairy, much shorter than the tube, dilated above, stigma conic. Fruit with the persistent perianth much enlarged, half an inch long, capsular, flattened pear-shaped with a long narrow base dilated at the end, 1½ inch long pubescent grey when dry, grooved down each face and ½ an inch wide at the widest part, thinly woody two valved with a partition along each cell. Seed ⅜ inch long ovoid cordate with the funicle ¾ inch long conic at the base and tapering into a filament. Dense woods Singapore, Kranji; Johor, Bukit Pengaram, Batu Pahat.

The species belongs to what was originally made a distinct genus under the name of *Gyrinopsis*, differing from the typical Aquilarias in its long-tubed flowers. In this it is allied to a Philippines species known as *A. Cumingiana* but it differs from that in in the hairiness of its leaves. The hairiness of the back of the leaves distinguishes the species from any others yet described, in all of which the leaves when full grown are quite smooth. The flowers are silky within and without. The scales in the mouth of the tube are represented by a thickened densely hairy ring between the anthers and the lobes of the flowers. The tube of the flower is also covered thinly with silky hairs. The pistil has a narrowed base and is rather abruptly dilated above; this narrowed portion perhaps corresponds to the stalk of the pistil in Gyrinops, the ovules being in the slightly dilated portion of the upper part. The tree as has been said is much smaller than the Garu. When cut down, however, it is seen that the centre of the wood (more than half of it) is of a dusky blackish grey, the sapwood being white. This centre is the aromatic portion.

A list of the known species of *Aquilaria* with their distribution may be useful.

A. agallocha Roxb. India—Eastern Himalayas from Bhutan to Martaban.

A. malaccensis Lam. *A. ovata* Cav. *A. secundaria* Dec. Malay Peninsula from Penang to Singapore; Bintang, Borneo, Sumatra.

A. microcarpa Baill. Borneo.

A. ophispermum Poir. *A. chinense* Spring. *Ophispermum sinense* Lour. Cochin China.

A. grandiflora Benth. Hongkong.

A. hirta Ridl. Malay Peninsula.

A. cumingiana Dec. Philippines.

EXCLUDED SPECIES.

A. bancana Miq. *A. macrophyllus* Miq. Both Gonystylus.

A. pentandra Blanco. A Philippine plant quite indeterminable and certainly no Aquilaria.

NOTE.—The *Gonystylus* is stated by Miquel to be called Garu Anteru by the natives of Sumatra, and to be used for the same purpose. The Garu champaka (Agallochum spurium) of Rumph appears to be this plant. He says it gives a false Garu. *Gonystylus Maingayi* is not rare here. I have never heard of its producing any incense wood, nor have I ever heard any native name for it.

PAHANG CHANDAN.

Wikstroemia Candolleana, Meisn.

Mr. W. D. Barnes, who made an interesting collection of plants on Bukit K'luang Terbang in the Gunong Benom range in Pahang last year, obtained among other specimens, flowers fruit and leaves of a plant supplying Chandan. With them he sent a portion of the stem of the tree. This plant proved not to be an *Aquilaria* at all, but *Wikstroemia Candolleana* Meisn., a very different looking plant but belonging to the same order *Thymeleaceæ*. It is quite a small tree about 6 to 10 feet tall, with a light coloured thin bark and white sapwood, the centre being of a greyish black, and resembling that of the *Aquilaria hirta.* The twigs are slender, the leaves opposite ovate to ovate lanceolate acute with short petioles, the racemes of small yellow flowers, terminal gradually increasing as the flowers open and fall, at length over an inch long and very slender. The flowers ¼ inch long, tubular. Fruit a small red drupe. It occurs in Perak on Gunong Hijau, also on the sea-coast at Kamposa, in Kelantan, and on Kedak Peak, and in Java. It is typically a mountain plant growing at an altitude of about 4,000 to 5,000 feet. There are two other species in the Malay Peninsula, viz. W. *Indica* Mey, and *W. viridiflora* Meisn., both small. *W. ovata* C. A. Mey, of the Philippines, is said by Blanco to produce an aromatic resinous wood.

Mr. Barnes says " The scented wood occurs very irregularly. The largest trees on the hill were saplings only of about 4 inches diameter and frequently without a trace of dark wood near the ground, though it might occur through a couple of feet or so higher up, also *vice versa.* The dark wood was always in long pieces but not always concentric with the tree. Many saplings contained none at all. It may interest you to know that the only proper way to treat chandan when you get it is to cut away the white wood and wrap up the valuable dark wood in Lobak leaves; (probably those of *Susum anthelminticum*); no others should be used. Chandan is of three kinds and grows to one foot through at very most.

(1) Daun halus dan putih (*Wikstrœmia Candolleana*);
(2) Batang hitam daun seperti daun tanjong;
(3) Daun kasar seperti gaharu.

Garu, he states, is of only one kind, and grows up to 2 feet in diameter. Bland also states that the Chandan tree differs from other garu trees in having a maximum diameter of 1½ feet and very soft sapwood. He states that of the varieties he mentions in his list, Chandan and Tandok are the most valuable. " Chandan is oily, black, glistening. It sinks in water." A specimen of " Chandan " from Pahang sent by Mr. Machado closely resembles garu. It is dark, hard, deep brown, exuding slowly drops of deep brown oily resin. Malays who have seen it call it Garu.

There is evidently much confusion in the use of the name Chandan among the Malays, and there are evidently yet more incense woods in the Peninsula of which the origin is not yet known. Those who have the opportunity of getting specimens of these would do well to secure them in order that we may discover what the plants are.

Calogramma festiva Walk.

BY H. N. RIDLEY.

This handsome and widely distributed moth is a great pest in our gardens on account of the damage its caterpillars cause to *Crinums* especially *C. asiaticum.* I can find, however, nowhere any description of the larvae, so that it may be well to describe the life history of it as far as I can. The eggs are very small, white, bunshaped, with numerous regular grooves and ridges from the top downwards, finely reticulate with circular reticulations. The moths (in captivity) laid about 40 all close together. The young caterpillars are nearly smooth with a black head, the body marked with fine black and white alternate lines, a transverse black band on the fourth segment and two black spots on the last segment but two, belly and legs pale reddish. They feed in rows on the epidermis of the leaves of the Crinum or on the fruit. As they grow larger they separate and attack chiefly the bases of the leaves and central shoot, quite spoiling the appearance of the plant but rarely killing it. The full-grown caterpillar is an inch and a half long and very thick, smooth with a shining chestnut head, body black above with undulating white streaks running along the back and a central ochreous one. A velvety black bar runs across the fourth body segment, an ochre coloured band runs along the side above the spiracles. The spiracles are black with a white spot behind each; belly dull cherry red, fore legs black, the others dull red with a black spot above each foot. It is rather an active caterpillar, when disturbed. At rest it partially curls up. It makes no cocoon excepting now and then it binds a lot of excreta together, but usually turns into a pupa loose in the sheathing part of the leaf. The pupa is nearly an inch long, dark chestnut colour. I met with adult larvæ and pupæ on September, and saw also young larvæ a week earlier. It remains about a week in the chrysalis. The moth is very handsome, about two inches across. Head and thorax cherry red, upper wings creamy white on the outer edge, centre veined and beautifully streaked with white, black and carmine, and there is a large carmine patch transversed by white veins on the upper edge. The lower wings are white and semi-transparent. I have never seen the moth at light nor caught it at flowers, but have taken it at rest in the day time on the back of Crinum leaves.

Supplementary Notes on the Flora of Singapore.

By H. N. Ridley.

The following notes, additions and corrections of the previous list, are based on identifications sent from Kew, and from the later numbers of King's Materials for the flora of the Malay Peninsula, together with notes on some plants collected in Singapore since writing the list.

Magnolia Maingayi King, (*Magnoliaceæ*). This charming and deliciously scented magnolia was unexpectedly discovered in the Garden jungle. Hitherto it has only been known as a hill plant in Perak and Penang, but as it has never been in cultivation in the Gardens I conclude that it cannot here be a garden escape. The flowers are creamy white, and open in the afternoon.

Xylopia dicarpa (*Anonaceæ*). Hook. fil, a tall tree, Bukit Timah.

Limacia triandra Miers. (*Menispermaceæ*). This is I find the plant mentioned under the name of *Hypserpa triflora* Miers.

Brownlowia lepidota (*Tiliaceæ*). In mangroves. Kranji.

Br. Riedelii Hemsl. (*Tiliaceæ*). Tree. Bukit Timah.

Br. lanceolata Benth. (*Tiliaceæ*). Flowers deep rose colour, a shrub in tidal mud. Gelang.

Sloanea javanica Miq. (*Tiliaceæ*). A tall tree with white flowers, Kranji (*Echinocarpus*).

Gomphia Hookerii var. *corymbosa* (*Ochnaceæ*). This name has been given for a medium sized tree with crowded white flowers, growing on the top of the hill at Bukit Timah. It is quite a different looking plant from the typical *G. Hookerii*

Planch with its deep claret coloured flowers and must I think be a distinct species, but I cannot find that it has been described anywhere.

Gonystylus Maingayi Hook, fil. This abnormal and puzzling tree has been classed among the *Thymeleaceæ*, and also among the *Tiliaceæ*, and finally given an order all to itself *Gonystylaceæ*. It is rather incompletely described in the Flora of British India, and a more complete account of it would not be out of place. It is a tree of no great size with smooth dark-coloured bark. Leaves oblong lanceolate acute coriaceous deep green with numerous close veins and smaller reticulated ones quite glabrous except for some appressed hairs along the midrib on the back, and a pubescent petiole. The blade is about six inches long and 2½ inches wide, the petiole thick half an inch long. The flowers are in lax axillary and terminal panicles about six inches in length and tomentose, they are arranged in threes on short thick tomentose peduncles. The pedicels are ¾ inch long. The flowers ¼ inch across green all pubescent. The sepals are five ovate triangular blunt valvate very thick pubescent outside and covered with thick long hairs inside. There are no petals but a close ring of setaceous processes as long as the stamens rises from the base of the petals. The stamens are very short, filaments very short and slender, anthers oblong basifixed. The pistil globose hairy, the style very slender and filiform. The fruit is oblong elliptic two inches long and one inch through, dark brown and woody pitted all over, when ripe splitting into two or three lobes more than ⅛ inch thick. Seeds two elliptic oblong nearly as long as the fruit and half an inch thick light brown.

It occurs in Singapore in the Garden Jungle, Bukit Mandai, Bukit Timah. Malacca at Brisu. Penang at Government Hill, and Balik Pulau. Perak at Tapa, Larut.

The fruit in herbarium specimens often splits long before it is ripe, hence the error in the Flora of British India where it is stated that the fruit is flat and semicircular. The Brisu and Bukit Timah specimens have very small narrow leaves only three inches long and 1½ wide, but I have no reason to suppose that they belong to another species.

Two other species of this genus are recorded. *G. Miquelianus Teysm*, and *G. Bancanus*, of which latter however I can find no description and it is probably the same thing. The first of these is well figured in Miquel's Ann. Lugd. Bat. vol. 1. Pl. 4. It is a native of Java, and is certainly very closely allied to our species, but the leaves are rather larger, the flower twice as large, and the fruit instead of being brown, rough and hard is larger, smooth and orange coloured. It is said to supply a kind of Garu wood.

Triomma Malaccensis Hook. fil. This remarkable tree seems never to have been completely described, the flowers having been hitherto practically unknown. A tree in the Botanic Gardens however flowered in November, and I therefore give a complete description of it:—

A tree about 60 feet tall with grey bark flaking from below, so that the stem is very rough. Leaves alternate exstipulate about six inches long, petiole swollen at the base, leaflets 7, petiolules ⅛ inch long, blade lanceolate acuminate, bases unequal, 2½-3 inches long, coriaceous dark shining green above with paler nerves, pale green beneath, panicles subterminal shorter than the leaves, viscid pubescent branches shorter. Flowers ⅛ inch across green, scented like cowslips. Bracts minute ovate, pedicels ⅛ inch or a little longer viscid pubescent nodding. Sepals 5 ovate lanceolate pubescent. Petals longer lanceolate whitish green minutely pubescent. Disc narrow five lobed. Stamens very short 5 from within the disc, filaments short free. anthers dorsifixed small ovoid chestnut. Pistil trigonous green. Stigma 3 lobed yellow. Fruit capsular of three flat ovate coriaceous woody valves two inches long and as wide. Seed one in each cell ½ an inch long, surrounded by a thin brown wing ovate cordate in outline as large as the valve. Singapore, Malacca and Sumatra.

This tree is remarkable in the order for its really capsular fruit and thin large-winged fruit seed and unlike nearly all other species it has only five stamens, most *Burseraceæ* having ten. As mentioned in Journ. As. Soc., S. Br., Vol. 34, p. 91, when cut it exudes a very aromatic resin.

Luvunga eleutheranthera Dalz. In the list should be *L. scandens Ham.*

Cedrela febrifuga Forsten. (*Meliaceae*) occurs at Pongol, probably introduced.

Salacia viminea Wall. (*Celastrineæ*) a climber, Garden Jungle.

Smythea pacifica Seem. (*Rhamneæ*) A climber with green flowers. Serangoon River.

Pygeum Maingayi Hook fil. (*Rosaceæ*) the plant mentioned under this name is *P. persimile* Kurz.

Rourea similis Bl. (*Connaraceæ*). Climber, Bajau.

Dioclea reflexa Hook fil. (*Leguminosæ*). A climber with violet and white flowers strongly scented of musk. Hedges by the Reservoir.

Sonerila begoniaefolia Bl. (*Melastomaceæ*). *S. moluccana* Roxb. and *S. heterophylla* Herb. of the list. There is much doubt as to what Roxburgh's *S. Moluccana* was, so that the later name of *S. begoniaefolia* must be adopted.

Medinilla Maingayi C. B. C. This is the plant described as *Pachycentria glauca* Triana.

M. crassinervia Bl. is the plant called *M. macrocarpa* Bl.

Pachycentria macrorhiza Bece should be *P. tuberculata* Korth.

Pternandra. King in the "Materials" reduces the species of *Pternandra* and *Kibessa* to three species.

(1.) *Pt. coerulescens* Jack. var. *Jackiana* the common form var. *Capitellata.* (*Pt. capitellata*) and var. *paniculata* (*Pt. paniculata*).

(2.) *Pt. echinata* Jack. (*Kibessia echinata* Cogn.) including *K. acuminata* Decne.

(3.) The third species *Pt. Griffithii* King, I have not seen here.

Memecylon. The following is a revised list of the Singapore species elucidated by the " Materials."

M. pubescens King. Tanglin, Nassim Hill.

M. heteropleurum Bl. Nipis Kulit, common.

M. amplexicaule Roxb. Chan Chu Kang.

M. microstomum Clarke. Changi.

M. campanulatum King. Garden Jungle (5763).

M. myrsinoides var. *lilacina* Chan Chu Kang.

M. lævigatum Bl. Common on sea coasts, Kranji, Sungei Buluh and Bukit Mandai.

M. oleæfolium Bl. A handsome small tree with copious small flowers petals pink stamens blue. Garden Jungle. Selitar.

M. acuminatum Bl. Bajau, Kranji.

M. garcinioides. Bukit Timah. Garden Jungle.

M. edule Roxb. Shrub or small tree usually near the sea. Common, Pulau Brani, Changi, Tampinis, Serimbun, Pulau Tekong and Sungei Morai.

Var. ovatum. Pulau Serapu. Pulau Merambong. A fair-sized tree, with larger panicles of blue flowers.

Trichosanthes cucumerina (*Cucurbitaceæ*). A small creeping pumpkin with white flowers and fusiformed fruits, appeared in cleard ground in the Economic Garden near Dalvey Road.

Webera Ridleyi Pearson (*Rubiaceæ*). This is the name given to a pretty sweet scented white flowered shrub growing in wet woods at Chan Chu Kang and Mandai.

Urophyllum trifurcum Pears (*Rubiaceæ*). A new species of this genus. It is a small tree which grows in dense forest on Bukit Timah.

Geophila pilosa Pears. This is the plant named *Glirta* Miq. in the list. Mr. Pearson considers it distinct and new.

Poederia foetida Bl. In the list is identified as *P. verticillata* Bl. at Kew.

Finlaysonia obovata Wall. (*Asclepiadeæ*). Tidal Rivers Rochore and Kranji etc. common. This curious plant grows in the form of a creeping shrub in the mud of the rivers, forming thick masses, eventually sending up long and climbing and twining stems, very milky when broken, which twine round the bushes for some height. The flowers which are not very commonly produced, are in spreading cymes pinkish. The follicles of the fruit, green tinted with purple, are large and thick. The flat seeds have a few hairs on the end.

Willughbeia rufescens Dyer. This is the plant mentioned in the previous list as W. sp. near *flavescens.* Changi, Chan Chu Kang and Jurong.

Centranthera humifusa Wall. (*Scrophularineæ*). A small prostrate plant with yellow flowers, brown in the throat. Rare, grassy spots. Along the Bukit Timah road about the 10th mile. Common in Malacca.

Peronema canescens Jack. (*Verbenaceæ*). A tree with pinnate leaves and corymbs of whitish flowers. It generally grows in damp spots near rivers. It is one of the few trees we have which regularly sheds its leaves completely. Bukit Mandai, Selitar Bungalow and Fort Canning.

Jasminum anastomosans Wall. (*Oleaceæ*). A rather slender climbing Jasmine obtained in the Mandai Woods near the new railway appears to belong to the species or at least to be closely allied. It has elliptic lanceolate acute leaves triplinerved rather thin in texture, 3 inches long by one wide, and short petioles. The panicles are axillary with a very slender peduncle an inch long and 3 or 4 flowers on slender pedicles $\frac{1}{2}$ inch long. The calyx has 7 linear teeth $\frac{1}{8}$ inch long, quite glabrous. The corolla is an inch and a half long with a slender tube $\frac{3}{4}$ inch in length, the lobes narrow linear acuminate ten in number all white. The plant is completely glabrous. *T. Anastomosans* Wall. is a native of India.

Bridelia pustulata Hook fil. (*Euphorbiaceæ*). A tree with yellow flowers and red drupes. Rogie, Tanglin.

Br. stipularis Bl. Small tree. Gaylang, Toa Payoh.

Plukenetia corniculata Sm. Akar Pina-Pina. A climbing plant racemes of minute green flowers and green four cornered capsules. Waste ground Economic Gardens, Chan Chu Kang.

Heterosmilax indica A. D. C. (*Liliaceæ*). Tanjong Katong, collected by Mr. Hullett some years ago, not recorded for the peninsula previously.

Naias graminea var angustifolia Rendle (*Naiadaceæ*). In a monograph in this genus Mr. Rendle makes the plant of the Gardens Lake to be this new variety of *N. graminea.*

Rottboellia exaltata L. (*Gramineæ*). A weed in the Economic Gardens probably introduced accidentally.

Trichomanes Motleyi V. D. Bosch. This very curious little fern is abundant on trunks of trees in the Fern valley at Bukit Timah and at Stagmount. It looks more like a hepatic than a fern which is probably the reason for its being often overlooked. It has only been recorded from Borneo.

The Sakai Dialect of the Ulu Kampar, Perak.

By H. L. E. Luering, Ph. D. (Strassburg).

In 1891 Mr. Hugh Clifford published in No. 24 of this Journal some very valuable notes on the Sakai dialects of the Malay Peninsula, and three years later, in No. 27, Mr. C. Otto Blagden, in an ingenious compilation, first proved the close affinity of these and other tongues with the branches of the large family of Indo-chinese languages, especially with the Mon (Pegu) and the Khmer (Cambodja). Till the year 1894 the linguistic position of these people was absolutely unknown. Mr. Vaughan Stephens believed to have found in these languages similarities to the Tibetan, while Mr. Clifford expressed an opinion that he could find a connection between the dialects of the Sakais and the Semangs on one side and those of the Dayaks of Borneo and the Papuans of New Guinea on the other, but later investigations have proved that all these languages are altogether dissimilar in phonology, grammar and syntax.

A complete vocabulary of the Sakai dialects is yet a great desideratum of the linguistic science, and while the following list of words does not claim to be at all complete, even of the dialect represented, the author gives it to the public to encourage future investigators to further effort. No trouble has been spared to express the sounds of the language as clearly as possible in accordance with the most approved standards of phonetic transliteration, and in that respect the following pages may even be useful where they repeat words known from earlier vocabularies. Though endeavouring to give as many pure Sakai words as could be found, the author has regarded it necessary to give in some instances Malay words (sometimes more or less corrupted) where such have crept into every-day use among the people; these are marked with an asterisk. No student of the language and customs of the Sakais can fail to notice the increasing influence of the Malay language among them, especially in places where the Sakais have begun to frequent the public markets, as in Tanjong Rambutan, Gopeng, Kuala Dipang, Kampar, Tapah, Bidor in Perak, and doubtless in many other districts.

The language represented in the following pages is that spoken in the settlements on either side of the upper course of the Kampar River*) in the Ulu Pulai, Ulu Gopeng, Ulu Kampar, as well in the hills around Batu Gajah, while the inhabitants of the Ulu Kinta speak a language unintelligible to this tribe. I have not been able to find any tribal name among the people, though they evidently are what has been called Sĕn-oi by and since Mr. Clifford. The only appellation with which I have always heard these people designate themselves is "Mai Srāk" i. e. the people of the country or the jungle, in contradistinction to the "Mai Gōp" (also Mai gå), the strangers i. e. the Malays. I have never heard in conversation the expression "Gob Malayu" given by Mr. Clifford, except when "Malayu" was given as translation of "gōp", as in dük, rumah or house.

Sĕn-oi seems to be a variation of the word sıg-ón which means "man".

In the transliteration used in the following pages, I have expressed the accentuated syllable, whenever this has been necessary, by an acute ('), while (¯) merely indicates the length of the vowel over which it is placed. All vowels have the Italian sound except the following:

å sounds like Swedish å or Danish aa, similar to English aw in saw."

ä has the sound of the German Umlaut, similar to English ai in "air".

ü and ū sound as in German "Würde" and "für", or as in French "sur" and "sure"

A peculiarity of this language which ought not to remain unnoticed is the pronunciation of final diphthongs, ai, ao, oi and ui, which are almost pronounced as if the latter vowel had become a consonant y or w (resp. v). The same pronunciation is found in several languages of the Philippine group of languages, notably in Tagalog. So the words jngkāo (chin), sntāo (tail), ’mpāi (salt), subāi (to boil, esp. vegetables), pōi (to burn), ’ntōi (big, great), sūi (alive), kūi (head), are pronounced as jngkāw (or (jngkāv), sntāw (or sntāv), ’mpāy, subāy, pōy ntōy, sūy, kūy, w (resp. v) and y having always the semi-vocalic, semi-consonantic value.

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* The latest Map of the Malay Peninsula is unreliable in the upper courses of this and neighbouring rivers. It is very desirable that the latest surveys of the Government and of private surveyors should be published.

Another peculiarity is found in the pronunciation of final n, which sounds as something between n and d. Even Malay words are pronounced in this way, the word pinggan (plate) sounding very much like pingād. No character being available, I shall express this sound by n(d), as in chĕlōn(d), after.

No further remark need be made regarding the pronunciation of the other consonants, I will merely remind my readers that kh and th have the real aspirate sound not found in English, but approximately produced in combinations as the following, when pronounced rapidly: ink-horn, ant-hill etc., certainly not as the Arabic خ kh and ث th, or as in English ch (loch) and th.

It would be interesting to give in connection with this list of words the various equivalents in Indo-Chinese languages, as Mr. Blagden has done, but this can be postponed until larger vocabularies of all the dialects are at our disposal.

Above . . .	†kngkmēr
Absent . . .	*ti ta’ (tidak)
Accept, to . . .	’ngkån
Accurate . . .	*bĕtul
Accustomed . . .	*biaså’
Ache . . .	nī, nyī
Acid . . .	*asam, *masam
Across . . .	kn-tü
Act, to . . .	bü’, ui
Add, to . . .	*tama’ (tambah)
Afraid . . .	sngå
After (place) . . .	chĕlōn(d)

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† It will be noticed that ng and n are often used as vowels, therefore this transliteration is preferable to kĕngkmēr as there is no ĕ audible in the word. Where vocalic ng and n are found initially an apostrophe has been prefixed.

Afternoon	ya-dui
Again	nēn
Aim, to	*tuju’
Air	pås
Alike	*s-rupå’
Alive	sūi, sūy
All	di-düt
Allow, to	*biar
Always	*slalu
Among	’ŋgüŋ
Ancestor	atå’
Angry	biläs
Animal	*binātak
Another	*asik (asiŋ)
Answer, to	*bijawab (berjawab)
Ant	lās
Arm	kŋgrīd
Armlet	*glāk (glaŋ)
Ask for, to	smān
Bamboo	awād
Banana	tĕlāi, tĕlāy
Bark, to	kijān
Basket	*bakul
Basket (raga)	gala’
Bathe, to	mamuk
Beat, to	kü
Belch, to	gĕr-’m
Belly	kăd
Betelnut	blük
Big	’ntōi, ’ntōy
Bird	chēp
Bite, to	lĕmūin
Black	mĕ-äk
Blind	buta’
Blood	bĕhīt
Blow, to	pūn(d)
Blow up the fire	thōd ås
Blowpipe	blāo, blāw
Blue	’mpēr

Blunt . . .	blok
Board . . .	*papan
Body . . .	brok
Boil, to . . .	subāi, subāy
Bone . . .	jĕā'
Born . . .	igōi, igōy
Borrow, to . . .	*pinjam
Boy . . .	saŋit krāl, seŋ yen
Brave . . .	*brani'
Breast . . .	'ntĕ'
Breath . . .	nahám, lahám
Brother, elder, . . .	tĕnä'
Brother, younger, . .	mĕnāŋ, mĕnāŋ 'ŋsīl
Bucket . . .	*timba'
Buffalo . . .	*kĕrbau
Build, to . . .	ūi
Bullock . . .	*lĕmbu
Burn, to . . .	pōi, pōy
Butterfly . . .	kĕrbāk
Buttocks . . .	kēt
Buy, to . . .	*bli
Call for, to . . .	chip
Call at, to . . .	*siŋa' (siŋgah)
Call out, to . . .	jāp, jinjāp
Can . . .	*boleh
Candle . . .	*dian
Cane, rattan . . .	chōk
Cannot . . .	*ta'boleh
Cap . . .	*kopiah
Carry, to . . .	tarek
Cat . . .	*kuchik (kuchiŋ)
Catch, to . . .	chāp
Child . . .	knōn
Chin . . .	jŋkāo, jŋkāw
Clean, to . . .	sūd
Cloth . . .	ābat
Coat . . .	*bayu (baju)
Cock . . .	pōk ibü'
Come . . .	bai

Come, to	hōl, ohōl
Correct	*bĕtul
Cow	*lĕmbu iknān
Cry, to (weep)	jāp, jinjāp
Curly	trūan
Cut, to	kho'
Dart	grōg
poisonous dart	grōg maŋchŋrä'
dart without poison	grōg ti ta' b-chŋrä'
Day-light	ya
Dead	dāt
Die, to	dāt
Dog	chō'
Don't	duagu
Don't want!	nyah, 'nnyah
Drink, to	ŋūn
Dry in the sun, to	tltī'l
Ear	'ntāk
Earth, ground	teh
East	(majĭ) ya, i. e. day-light, sun-rise.
Eat, to	chā
Egg	pŋlü'
Elbow	kanāŋ
Eye	māt
Face	*muka
False, deceitful	mĕlĕnun
Far (distance)	nyah, 'nnyah
Fast, quick	ageg
Father	abü', apá
Female	kna' ,kĕrdōl
Female (of animals)	iknān
Fence	*pagar.
Fever	nī, nyī.
Field, plantation	slāi, slāy
Fin of fish	dichür.
Finish	hōd.
Fire	ås.
Fish	kå.
Five	*lima'.

Flesh	saty.
Flooring	rēs.
Flute	jnilōi, jnilōy.
Foot	ju', juk.
Forget, to	sēp.
Four	*ampat.
Fowl	pōk.
Friend	*kawan(d), *kabad.
Frog	tabā̆g.
From	jinjak.
Front, in	ngār
Fruit	plē
Fry, to	*goreng, *rĕndang.
Full	tĕbū̆k.
Gill of fish	'ntāk (ear).
Girl	kna', sangit kĕrdōl.
Give, to	åg, og.
Go, to	chichēp.
Go down, to	chĕlu'
Go up, to	hūn(d)
Good	bōr.
very good	abōr-bōr, bōr mĕnānang
Great	'ntōi,'ntōy
Green	blāar.
Hair	sōk.
Half	nglū̆k.
Hand	tāk.
Haste	geg, ageg.
Head	kūi, kūy.
Hear, to	gĕrtū̆k.
Heart	nūs, inūs.
Heat	pngräk
Heavens	sūi, sūy.
Heavy	nyü'.
He, him, she, her	ilüi, ilüy.
Hen	pōk iknān
Here	madĕ
High	chĕrāk (i. e. long).
Hold, to	chāp, *pĕgāk (pĕgang).

Hot . . .	bĕkäk.
House . . .	dūk
How many? . . .	bräp i jŋōi.
Hush . . .	dūi
Hut . . .	dūk
I . . .	ain, eŋ, 'ŋ.
In . . .	katĕ
Incantation . . .	*jampi.
Is, there is . . .	ti
Kick, to . . .	chĕgōg
Knee . . .	kurōn.
Knife . . .	yōd.
Ladder, stairs . . .	rŋkal
Land (darat) . . .	srāk.
Leaf . . .	slå
Leech, jungle- . .	plap
Leech, swamp- . .	*lintah.
Leg . . .	kĕmūŋ
Lie down, to . . .	dada'
Light a fire, to . . .	pĕdar ås
Lightning . . .	blēd
Lime (mineral) . . .	kāp
Listen, to . . .	gĕrtūk
Little, a . . .	geg
Live, to (dwell) . . .	hāus, üi, üy
Lizard, gecko . . .	*chichak
Long (measure) . . .	chĕrāk
Long (time) . . .	līŋ
Look at, to . . .	nēŋ
Look for, to . . .	käh
Lose, to . . .	'nyāp
Low . . .	lēŋ, pate'
Mad . . .	*gila'
Maggot . . .	kmūŋ
Make, to . . .	bü
Malay . . .	Mai gop, mai gå
Male . . .	krāl, 'ŋsīl
Male (of animals) . .	ibü'
Man . . .	sŋ-ón

Mangosteen	plē sĕmĕtá’
Many	je’ōi, je’ōy, jŋgōy
How many?	bräp i jŋgōy
Market	*pasar, *pĕkan
Marry, to	bĕ-kna’, gigūy samå krdōl
Mast	chĕnōŋ
Mat	chĕru’, jĕru’
Mat (kajaŋ)	*kājak
Matches	*gra’api
Mattress	*tilam
May be	kĕnid jī'
Me	ain, eŋ
Meat	saty
Medicine	pŋglāi, pŋglāy
Meet, to (congregate)	kāmin
Mind, to	*pduli
Mind, to (think of)	*iŋgat
Mind, to (beware)	*jaga’
Mind, sense	*akal, nūs, inūs
Never mind	ta’ mā
Miss, to	sā̆
Mistake	*salah
Mix, to	*champur
Moment, a	bramōs
Money	ibås, *duit
Monkey, pig-tailed	dåk
Monkey, long-tailed	rāo
Moon	gĕchēk
More	nā̆n, lā̆d
Morning	po glāp
Mosquito	kĕmūn
Mother	amē’, kĕnüŋ
Motion, to have a	chachó
Mountain	lū̆p
Mouse	plåk
Mouth	nyūŋ, nyiūy
Move, to (remove)	hi at
Much	jĕōy, jŋgōy
Mud	*payak

Nail, finger-	mu tāk
„ toe-	chŋrōs
Name	imu'
Net, casting	*jală'
Nice	*sĕdap
Night	mŋåd
Nine	*sĕmbilan
Nose	må
Not	ti tå'
Not, do	duagu
Not yet	pasek
Now	då'hn, gagek da
Old	diŋrå'
One	nanu'
Painful	nī, nyī
Paint, to	hichit chat
Pair	nanu' klamin
Palm, Bertam-	*bĕltāp
Parcel	cha åm
Parents	kĕnüŋ-mĕnüŋ
Partly	'ŋlū̆k
Pass, to	*lalū
Past	hōd
Path	nuŋ, noŋ
Pattern	*achu
People	mai
Perhaps	kĕnid jī'
Pick up, to	hi chōd
Picture	*achu
Pig	lū̆
Pigeon, green	mŋyū
Pineapple	nĕnās
Pipe for water, etc.	tŋlōr
Pitch	*damar
Plant, to	chăd
Plantation	slāi, slāy
make a plantation	bü slāy
Plate	*piŋān(d)
Poison for arrows	chŋrä'

Poisonous . . .	mangchngrä'
Pot, earthenware . .	blanga'
Pour, to . . .	kå (tü)
Power, ability . . .	sĕgāo, sə̆gāw
Prawn , . .	*udang
Pray, to . . .	smān
Present, to . . .	åg, og
Present, at . . .	då'hn
Presently . . .	bramōs, bramå
Press, to , . .	*tĕkan
Profit . . .	*untong
Promise, to . . .	*janji
Pull, to . . .	jāk
Pull out, to . . .	hitak
Put there . . .	dä pasə̆
Put on (clothes). . .	lok
Put out (fire) . . .	lat
Python . . .	ĕrlōi, ĕrlōy
Quiver . . .	lak
Rain . . .	maní'
Red . . .	rān
Remain, to . . .	gigūi, gigūy
Rest . . .	gigūi, gigūy
Return, to, go home . .	'njūk
Rice (in the husk) . .	ba
Rice (husked) . . .	chngrong
Rice (boiled) . . .	chaná
Rice-pounder . . .	gūl
Righteous . . .	ninai
Ring . . .	*chinchin
Ringworm . . .	gå
Ripe . . .	nūm
Rise, to (get up) . .	kūi, kūy
River . . .	tü
Roof, thatch- . . .	plōk
Root . . .	*akor
Salt . . .	'mpōi, 'mpōy
Salt, saltish . . .	*masin, *asin
Say, to . . .	pĕdēr

Scream to	jinjāp
Search, to	käh
Season	*musim
Seed	kĕbü’
Seize, to	chāp, *pĕgāk
Seldom	*jaraŋ
Sell, to	*jual
Send, to	*kirib (kirim)
Send for, to	*paŋgil, (paŋggil)
Send for, to (things)	*bsād (pĕsan)
Sense	*akal, nūs, inūs
Sensible	bōr akal, bōr nūs
Separate, to	ūi ṻ
Serious, important	nyü’
Set, to (said of the sun)	*tiba
Seven	*tujoh
Sew, to	hi chäk
Shade	*tĕdŭ’
Shake, to	’ŋgyük
Sharpen, to	chinī'
Shoulder	gĕlpāul
Sick	nī, nyī
Sick, to be (vomit)	takü’
Sickness	nī, nyī
Silent	dṻi.
Silly	*biŋguŋ
Sing, to	*dindaŋ
Sister, elder	tĕnă’ knă’
Sister, younger	mĕnaŋ knă’
Sit, to	gigūi, gigūy
Six	*anam
Skin	getü
Sky	sūi, sūy
Slay, to	pĕrdāt
Sleep, to	bā̈t, bubā̈t
Slip, to	yiok slaty
Slippery	slaty
Slow	*lēŋah
Slowly	*plahād-plahād

Sly	*chĕrdek
Small	bachin, bachit
Smell	ŋūi, ŋūy, iŋūy, iŋōy
Smoke	chas ås
Smoke, to	nyor roko'
Snake	tiji
Softly	*plahād-plahād
Soil, the	teh
Soul	lahám.-nahám
Sour	*asam, *masam
Speak, to	pĕdēr
speak lies	liŋlōd
Spirit	nya' ni
Spit, to	getå'
Stag	mŋ-hár
Star	pĕrlōi, pĕrlōy
Step on, to	bibāt
Stone	*batu
String	sŋrōi, sŋrōy
Sun	majĭ'
Tail	sntāo. sntāw
Tasty	*sĕdap
Tear, to	tēŋ, *charek
Ten	*s-puloh
There	ajĕ, ditü'
Thigh	lĕmpāo, lĕmpāw
Three	ni
Thumb	bu tāk
Thunder	'ŋkuh
Tie, to	chĕkat
Tiger	manus
Tin	*timah
Tobacco	*bakau
Tongue	lntå
Tooth	lĕmūn
Tree	jĕhu, jilok jĕhu,
Two	nār
Urinate, to	uŋnōm
Vegetables	subāi, subāy

Very	mĕnānang
Village	*kampong, *kampuk
Want, to	'nghōn
Weep, to	jāp, jinjāp
West	(mạjĭ') tibå'
What?	ma
Where?	bẹ̆lo, kumạ, mĕnung
White	biā̆g
Who?	bo i mān
Win, to	*mĕnang
Wind	pinūi, pinūy
Wire	*dawai
Wise	bĕrnūs
Wish, to	'nghōn
Woman	kṇa', kĕrdōl
Wood	jĕhu
Wrong	*salah
Yes	hå^{n}, 'ng-hng
You	he

Short Notes.

HABITS OF THE DRONGO.

It may often be noted that the common racket tailed Drongo, *Dissemurus platyurus*, has a habit of accompanying the common monkeys known as the K'ra (*Macacus cynomolgus*) as they wander along among the branches of the trees; so conspicuous indeed is this that the Malays sometimes call the bird Hamba Kerah; the slave of the monkey. Why the birds did so puzzled me for some time till I noticed that the monkeys as they go through the foliage disturb many insects such as the grasshoppers, moths and mantises. The drongo which always takes its food on the wing waits in a more or less open space generally behind the advancing monkey and catches the insects as they fly so that it is the monkey who is serving the drongo by driving its prey for it rather than the drongo who is the slave of the monkey.

THE SHORT-EARED OWL IN SINGAPORE.

A fine specimen of the short-eared owl (*Asio accipitrinus Pall.*) was captured in December last in the Alexandra Road, in Singapore, by a native who brought it to the Gardens where it is still alive. This owl has a very wide distribution, occurring in Europe including England, Siberia, China, India and Ceylon, but has never apparently been previously obtained in the Malay Peninsula. The bird was identified by Mr. A. L. Butler.

THE SUMATRAN RHINOCEROS.

It is well known that two species of Rhinoceros occur in the Malay Peninsula, the Javanese one-horned species *R. javanicus* and the two horned *R. sumatrensis*, but though many of these animals have been recorded as having been trapped or shot in various parts of the Native States, there are no records as to where the different species have been obtained and it is very seldom that any portions of the specimens have been preserved. Lately, however, two examples of *R. sumatrensis* have been on view at the Botanic Gardens and some notes on them may prove of interest. Both were females trapped at S'tiawan in Perak. The biggest and evidently the oldest measured 4 feet 8 inches at the shoulder with a length of 7 feet 4 inches to the root of the tail which was 22 inches long. The hide is covered everywhere with stiff black hairs, longest on the ears. In both the front horn was very short, a mere conical process, and the only trace of the second horn was a small rough plate in the older one and even that was absent in the second one. The animals were both of a quiet and inoffensive disposition, allowing themselves to be stroked and patted and readily fed from the hand although they had been quite recently caught. They ate sweet potatoes, sugar cane, champedak, fruits and leaves, and the leaves of the Mahang Putih (*Macaranga hypoleuca*) and various species of *Ficus* especially the *Waringin* (*Ficus Benjamina*), and when they wanted food call for it with a kind of whistle or squeak much out of proportion to the size of the animal. They made no other noise except by snorting now and then but in the forests, what I suppose to be the same species makes a loud neighing sound. These animals in captivity are very quiet for most of the day remaining immersed in a wallow of liquid mud and thickly coated with it after the manner of a buffalo. During the evening and night they are much more active roaming up and down the enclosure. They drink remarkably slowly and only a small quantity at a time, eat very large quantities of food, and pass the excreta always in exactly the same spot and almost always at night as the tapir does.

H. N. R.

In Memoriam.

Dr. N. B. Dennys.

The death of Dr. Dennys in Hongkong on Dec. 10th, 1900, will be deeply regretted by all who knew him, and as one of the first members of the Society, all must deeply deplore the loss of one who did so much for the Society in its earlier days. A short notice of his life has appeared in the North Borneo Herald from which I take a few facts as to his history. Nicholas Belfield

Dennys entered the civil department of the navy in 1855 and was present at the bombardment of Sveaborg, for which he received the Baltic Medal. He was appointed Student Interpreter at Peking in 1863 and from 1866 to 1876, edited the *China Mail* of Hongkong, was Secretary of the City Hall and curator of the Museum at that city. In 1877 he was appointed Assistant Protector of Chinese at Singapore and Librarian and Curator of the Museum. From 1879 to 1888 he was employed in Magistrate's work in Singapore, and then at Gopeng. Invalided home in 1889 he resigned in 1890, but in 1894 was appointed Protector of Chinese and Magistrate in British North Borneo and became the Editor of the British North Borneo Herald, and in 1899 Acting Judge and Member of Council. Dr. Dennys was Member of the Council of the Society from its very commencement in 1878 and remained so for several years and contributed largely to the Journal. Among his other publications were, Folklore of China, Notes for Tourists in the North of China, Handbook of Cantonese, Handbook of Malay, the Treaty ports of China and Japan, and other short papers on Chinese and Malay subjects, Natural History, etc. Although he resigned Membership of the Society in 1889 he took a great interest in its affairs till towards the end of his life. H. N. R.

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Notes on the Millipedes, Centipedes, Scorpions, etc., of the Malay Peninsula and Siam.

BY CAPTAIN STANLEY S. FLOWER, 5th FUSILIERS.

I. Introductory Remarks.

The animals which this paper is about, from their strange shapes, curious habits and the power of inflicting dangerous wounds which some possess, are of interest to most people, but especially to those who, having been brought up in England, where none but very small and harmless species exist, come to live in the East Indies, where a wonderful variety of these creatures flourish. However little one may care for natural history, one must come in contact with them, millipedes, centipedes, scorpions and spiders all entering houses and often turning up where least wanted, even in one's bath-sponge and bedding. When I arrived in the Straits Settlements, in March 1895, I knew practically nothing of these animals, how they were classified, how to distinguish between them, or which were poisonous and which harmless, and in no book or paper could I find the information wanted, so I set to work to collect and examine specimens, and compare them with such literature on the subject as was available. Mr. R. J. Pocock, of the British Museum of Natural History, most kindly gave me invaluable assistance in identifying specimens, and answering questions of all sorts about these animals, and finally has been so good as to look through my notes made in the Peninsula and Siam from 1895 to 1898. These notes, then, I venture to lay before the Society, hoping they may be of use to residents in the Straits, Native States and Siam, who are interested in these strange animals, and also hoping that they may help some more competent writer to compose a full catalogue.

The specimens I collected were distributed between the British Museum, and the Royal Siamese Museum, Bangkok; except some now in the Raffles Museum.

II. Position in the Animal Kingdom.

Millipedes, centipedes, scorpions and spiders all belong to the great collection of invertebrate animals with jointed legs which is for convenience grouped together and called the Sub-kingdom ARTHROPODA (or GNATHOPODA). Various opinions are held by naturalists as to the divisions into which this Sub-kingdom should be divided. Valuable papers on the subject appeared in "Natural Science" in 1897, by Mr. R. J. Pocock in the February number (p. 114), and by Prof. Ray Lankester in the April number (p. 267); from these the following provisional classification is adopted.

Sub-kingdom *Arthropoda.*

SECTION I. Prototracheata (or Malacopoda).

Class (i). *Prototracheata* (or *Peripatoidea*).

Containing the single family Peripatidæ, now divided into about four genera. A single specimen is on record from Sumatra, and Mr. H. N. Ridley informs me that the Skeat expedition recently obtained it in the Malay Peninsula. This very interesting animal has somewhat the general external appearance of a caterpillar, it has a pair of antennæ, and in the Sumatran specimen 24 pairs of legs (t. Sedgwick, Cambridge Nat. Hist., vol. v, 1895, p. 26).

SECTION II. Tracheata (or Lipobranchia).

Subdivision A.—Progoneata (or Prosthogonea).
- Class (ii). *Diplopoda.* "Millipedes" (vide post).
- Class (iii). *Pauropoda.* Containing the single family Pauropidæ.
  Minute creatures with twelve body segments and branched antennæ; which I believe have not so far been found in Malaya.
- Class (iv). *Symphyla.* Containing the single family Scolopendrellidæ (vide post).

Subdivision B.—Opisthogoneata (or Opisthogonea).
- Class (v). *Chilopoda.* "Centipedes" (vide post).

Class (vi). *Hexapoda* (or *Insecta*). The true insects, such as wasps, flies, butterflies, beetles, grasshoppers, etc., etc., divided into several orders.

SECTION III. Branchiata (or Acerata, or Sozo-branchia).

Class (vii). *Crustacea.* Crabs, lobsters, shrimps, woodlice, barnacles, etc., etc., divided into several orders.
Class (viii). *Gigantostraca*, divided into 3 orders:—
1st Order *Xiphosura.* Containing the single family Limulidæ (vide post).
2nd order *Merostomata* (or *Eurypterida*), extinct.
3rd order *Trilobita*, extinct. [It is probable that the Trilobita should form a distinct class].
Class (ix). *Arachnida.* Scorpions, spiders, etc., (vide post).
Class (x). *Pantopoda* (or *Pycnogonida*) " Sea-spiders."

II. Diplopoda.

The Millipedes, Class *Diplopoda*, are invertebrate animals found in all temperate and tropical regions, herbivorous, slow-moving and incapable of biting a human being, some are nearly 10 inches (254 mm.) in length. *Head.* The head is distinct and has a pair of short antennæ (composed of seven or eight segments) in front and two pairs of jaws on its lower surface. *Body.* The body is more or less elongated and consists of from 9 to over 100 segments, all much alike in structure. The majority of species are nearly cylindrical in cross section (but some are flattened), each segment being cased in a horny ring. *Legs.* The bases of the legs are almost in contact in the middle of the lower surface of the body, there are two pairs to most of the segments, the last pair of legs are never elongated.

Native Names for Millipedes.

Malay, *Gongok*, *Ulat-bulan.*
Siamese, *King keu.* [1894, p. 56).
Jakan, *Gr-gok* (Lake+Kelsall, J. S. B. R. A. S., No. 26,

Occasionally Millipedes are met with in very large numbers. The late Mr. Whitehead in his book "Kinabalu," p. 17, describing his visit to Malacca, writes, "On the way down from Mount Ophir I saw a wonderful gathering of pale yellow Millipedes, about six inches long; they were in a mass, one on the top of the other, which must have numbered several hundreds, and reminded me of a huge dish of macaroni." And I myself saw enormous numbers on the island of Kosichang, in the Gulf of Siam, when visiting it on the 27th and 28th of August 1897; the following extract from my diary may be of interest:—

"The chief living feature of the island was the Millipedes. From sea-level to the top of the hill, all about the ground under the shade of the trees and in the hot midday sunshine they were crawling about in hundreds and hundreds; the big red-brown ones (*Thyropygus*) were particularly conspicuous, 5, 6 or 7 often to be seen crossing the path within a few yards: some of these were uniform in colour, others banded alternately lighter and darker; then there were smaller Millipedes of a beautiful grey colour, and flattened ones (*Orthomorpha*); when we turned over dead leaves in the wood we found in the soil many small white-legged Millipedes, which when disturbed sprang about, very lively, hopping an inch or two off the ground, and were quite difficult to catch; a contrast to the numberless "Tikal" Millipedes (*Zephronia*), which were exceedingly numerous on the artificial stone work, and which when picked up always rolled into a ball and remained quite quiet." At the end of February 1898, I was again at Kosichang; *not one single Millipede was to be seen* abroad, but we found a few by searching in damp spots, underneath timber, old tins, etc. This shows how the different seasons affect these animals; and how a locality where in the dry season there seem to be none, in the wet season literally swarms with Millipedes.

An anomymous writer in a Singapore paper of(? 13th) October 1897, gives the following Malay account of the evolution of Millipedes, etc.:—"There is a belief that if the vertebral bone of a fish is kept under a mattress for some time it becomes a centipede, and that the strands which are found between the pulp and the rind of a plantain, commonly known as pisang klat, when securely bottled up and kept in a dark corner become Millipedes. There is also a belief that a fresh water fish, not unlike the European sly, and known to the natives as 'ekan klee,' is generated from a tadpole."

Key to Classification of Millipedes.

I. Body furnished with tufts of scale-like hairs. Antennæ eight jointed. Scent-glands absent. *Sub-class PSELAPHOGNATHA;* contains the single family *Polyxenidæ*, minute millipedes, "only about one tenth of an inch long" (Pocock, R. N. H. vol. vi, p. 209), so far not known from the Malay Peninsula.

II. Body not furnished with tufts of scale-like hairs. Antennæ seven jointed. Scent-glands usually present. *Sub-class CHILOGNATHA*; divided into three orders.

A. Body short and broad, 12 or 13 segments, second and last segments enormously enlarged, capable of being rolled into a ball, no scent-glands. *Order* ONISCOMORPHA.

B. Body elongate, 19 or more segments, none of them very much larger than the rest, capable of being spirally coiled (except *Sphæriodesmus*).

A. Last back plate forms a hood over the last pair of legs, 19 or 20 segments, no scent-glands, no known species exceeds a quarter of an inch (6 mm.) in length. *Order* LIMACOMORPHA, contains the single family *Glomeridesmidæ;* a species occues in Sumatra.

B. Last back plate forms a complete ring, enclosing the anal valves, 19 to over 100 segments, some species exceed 9¾ inches (say 250 mm. in length). *Order* HELMINTHOMORPHA.

a' Mandibles degenerate, from about 30 to over 100 segments, species seldom exceed 1½ inch (38 mm.) in length. Sub-order *Colobognatha.*

b' Mandibles normal.

a''. Pedal laminæ free, 30 to 32 segments, Sub-order *Chordeumoidea.* Small Millipedes known from Sumatra, Burmah, etc., but so far not from the Malay Peninsula.

b''. Pedal laminæ united to the terga.

a'''. From about 30 to over 70 segments, Sub-order *Iuloidea.*

b'''. 19 or 20 segments, Suborder *Polydesmoidea.*

Sub-class *Chilognatha.*

Order *Oniscomorpha.*

Short, robust Millipedes, convex above and flat below, capable of rolling themselves into a ball, hence popularly called "Pill Millipedes." The body consists of 12 or 13 segments, of which the first is very small, the second is enermously expended at the sides, and the last expended laterally and posteriorly, so as to entirely cover the anal region. Each typical body segment consists of 7 pieces; a large vaulted semi-circular horny plate forming the upper surface, and concealing the legs, beneath this on each side a small pleural plate, and between this and the two legs two still smaller tracheal plates bearing the stigmata, one corresponding to each leg. The legs are in contact in the middle line of the body, and those of the last pair, or last two pairs, are enlarged in the male and transformed into a pair of clasping organs. The back plates are not furnished with scent-pores. Pill-millipedes are found in North America, Europe, Africa, Asia and Australasia; some species attain a length of over 2¼ inches (or 60 mm.); they are divided into two families:—

A. 12 segments, antennæ close together. *Glomeridæ.*
B. 13 segments, antennæ further apart. *Zephroniidæ.*

Pill-millipedes may possibly be confounded at first sight with Woodlice, belonging to the Crustacea, and with certain wingless Cockroaches, belonging to the Hexapoda, which both occur in similar localities and surroundings; the cockroach can be at once detected by having only 3 pairs of legs, and the woodlouse by its having only one pair of legs to each segment, instead of two pairs to most segments as in the Millipedes. "Moreover, the hinder end of the body in the crustacean is composed of a number of small segments more or less closely crowded together, but in the Pill-millipede the last segment is much enlarged, and acts as a kind of protective cover to the lower side of the body when it is spherically rolled. Of course there are other differential characteristics between the two not less striking than that already mentioned; but it is needless to enter into them here." Pocock, J. B. N. H. S. vol. xii, p. 269 (1899).

Family *Glomeridæ.*

Pill-millipedes with the antennæ relatively close together on the front of the head, eyes with a single (lateral vertical) row of ocelli, a conspicuous horse-shoe shaped "sensory" organ between the eyes and the antennæ, and the body consisting of twelve segments; they are usually of small size, under $\frac{5}{8}$ of an inch (15 mm.) in length, and are found in England, Europe, North America, and parts of Asia. Though species of *Glomeris* are known from Tenasserim, Sumatra and Borneo, they have not yet, to my knowledge, been recorded from the Malay Peninsula.

Family *Zephroniidæ.*

Pill-Millipedes with the antennæ widely separated, situated completely at the sides of the head, eyes composed of a spherical cluster of ocelli, no "sensory" organ on the face between the eyes and the antennæ, and the body consisting of thirteen segments; they attain a length of over 2¼ inches (say 60 mm.), and are found in Africa, Madagascar, India, Ceylon, Sikkim, Burma, Siam, Cochin China, the Malay Peninsula and Archipelago, Australia and New Zealand. Over sixty species are known, divided into about seven genera. "A Monograph of the Zephroniidæ inhabiting India, Ceylon and Burmah" by Pocock, will be found in the Journal of the Bombay Nat. His. Society, vol. xii, (1899), pp. 269-285 and 465-474.

Genus *Sphæropæus*, Brandt.

Apex of the legs broad and truncate, the upper angle bearing a long spine above the claw, there being a considerable space between the claw and the spine.

1. *Sphæropæous zonatus*, Pocock. A.+M.N.H. Ser. 6, vol. xvi, 1895, p. 412. Recorded from Malacca.
2. *Sphæropæus bimaculatus*, Pocock. A.+M. N. H. Ser. 6, vol. xvi, 1895, p. 412. Recorded from Singapore.

Genus *Zephronia*, Gray.

Apex of the legs narrowed and pointed, the spine and the claw nearly contiguous.

3. *Zephronia anthracina*, Pocock. A.+M. N. H. Ser. 6, vol. xvi, 1895, p. 413. Entirely black, shining; reaches a length of 52 mm. recorded from Perak.

4. *Zephronia impunctata*, Pocock. A +M. N. H. Ser. 6, vol. xvi, 1895, p. 413. Pitchy black hinder borders of terga obscurely ferruginous, legs olivaceous; length 36. mm. I found a single specimen (the type) in the jungle near the big waterfall in the Botanical Gardens, Penang, in March 1895.

I got specimens of *Zephronia* also from Singapore, Selangor and Kosichang, of so far undetermined species.

Order *Helminthomorpha*,

Sub-order *Colobognatha*.

Small Millepedes, largest about 1½ inches (or 40 mm.) in length, with elongate bodies composed of from about 30 to over 100 segments; head often tucked under the first segment; mouth more or less adapted for sucking, the jaws being degenerate; known from England and also from most warm parts of the world; divided into several families.

Family *Pseudodesmidæ*.

5. *Pseudodesmus verrucosus*, Pocock. A. +M. N. H. Sept.'87, p. 222. Originally described from a Perak specimen, 34 mm. in length. In Sept. '97 I found one specimen of a beautiful pale cream colour at Dumdruan Estate, 700 feet elevation, Gunong Pulai, Johore.

6. *Pseudodesmus* sp. Yellow millipedes, 23 mm. in length. Ten specimens found under logs, etc., in the jungle near Hinlap, 700 feet elevation, and Muok Tek, 900 feet, in the Dong Phya Phai, Siam; November 1897.

Sub-order *Iuloidea*.

This sub-order includes the most typical millipedes, and also the largest, some being nearly 10 inches (254 mm.) in length; it is cosmopolitan. The mandibles are normal, the pedal laminæ united to the terga, and there are from about 30 to over 70 segments.

Families *Spirostreptidæ* and *Spirobolidæ*.

The Millipedes of these two families are numerous in the East Indies both in species and individuals; they may be thus distinguished :—*Spirostreptidæ*, first three segments with a pair of legs each, fourth legless. *Spirobolidæ*, first four segments with a pair of legs each. The collector will soon get to know the form of eye characteristic of each family, a useful way of distinguishing them, but not infallible, some species having eyes of intermediate shape.

Family *Spirostreptidæ*.

Genus *Spirostreptus*.

Ventral grooves short; distance between eyes about equal to half the long diameter of an eye.

7. *Spirostreptus vittatus*, Newport.

Pocock has given a coloured figure and description of this species:—

Max Weber, Zool. Ergebnisse III, p. 387, plate xxi, fig. 8 (1894).

This is a very handsome creature when alive, coloured in alternate bands of black and red-brown. When walking it carries the head low, and the antennæ are constantly employed feeling everything the animal approaches. Each leg seems to move independently, thus crossing each other in walking, and apparently impeding any rapid motion. They are usually found in jungle, crawling on tree trunks or on the ground, in the middle of the day, quite fearless of any enemy, and as far as my experience goes submit quietly to be picked up by a collector. I have found them on Penang Hill from 1100 to 2500 feet elevation (March and Nov. '96), near Chumar, Perak (Dec. '96), and on the Kuala Kangsa Pass, Perak (May '98); this last was the largest specimen I have seen measuring in total length 9¾ inches (= 248 mm.).

I also obtained a *Spirostreptus* of this, or an allied species, at Kulim, Kedah, in 1895; and two specimens near Muok Lek, 900 feet elevation, in the Dong Phya Phai, Siam, in Nov. 1897.

Genus *Thyropygus.*

Ventral grooves long and deep, distance between eyes about equal to or greater than the long diameter of an eye.

8. *Thyropygus perakensis*, Pocock.

Spirostreptus perakensis, Pocock, Linn, S. J. Zool. xxiv, p. 322 (lead figured). [1892].

The type specimen, from Perak, was presented to the British Museum by Mr. J. H. Leech; it is described as a male, 210 mm. in length, with 69 segments, and in colour polished black, with antennæ and legs reddish yellow.

9. *Thyropygus bowringii*, Pocock.

Spirostreptus bowringi, Pocock, Linn. S. J. Zool. xxiv, p. 321 (head fig. p. 322) [1892].

During the rainy season this species is very plentiful in Siam, coming out usually towards evening and wandering about gardens and paths, and also occasionally entering houses; during the rest of the year it seems to quite disappear, presumably it hides away in holes. I have met it in the following localities:—

Bangkok (May, June, July and August).
Ayuthia (June).
Pachim (April).
Kosichang (August).

Adults, of both sexes, have from 60 to 72 segments. The longest male I measured was about 5¾ inches (148 mm.), the longest female about 8⅝ inches (or 220 mm.).

Colour (from life), drawn up from a large series of Bangkok specimens.

The whole animal is of a very rich warm yellow ochre, with these exceptions:—the front surface of the head is a rich red-yellowish brown, sometimes darker between the eyes, it also gets darker towards the mouth shading into black on the upper lip. The antennæ are rich red-yellowish brown. The eyes black. The first segment behind the head is rich red-yellowish brown, getting darker towards its posterior edge. The remaining segments have each on their posterior part a very dark brown band, in some individuals pure glistering black, this band gets narrower and lighter in colour underneath as it approaches the bases of the legs, and is broadest on the centre of the back, where it is about twice the width of the intervening yellow spaces. The tail (last segment) is yellow, on its broader portion obscurely banded once with reddish-brown, and the hinder portion (as for instance the sides of the anal valves) are picked out with reddish brown, the sharp tip of the tail is, in some specimens, black. The legs are *more or less* shaded with light-reddish brown, differing in individuals. The position of the foramen-repugnatorum is marked on the sides of the somites by a dark grey half-moon shaped line.

These big Thyropygi when caught in the hand do not passively submit as most millipedes do, but twist about, rear up their heads, and bite one's fingers with their jaws, but of course without breaking the skin or hurting in the least; but their show of resistance is so vigorous that anyone unaware of their harmless character would naturally not attempt to touch them twice.

I have kept many individuals of this species in captivity; they feed readily on bananas, etc., but never seem to stop eating as long as food is available. One I noted (as far as I was able to attend to it) eat without stopping for fifteen hours on end. The difficulty of keeping them alive is to strike the medium between starving them and allowing them to overeat themselves, which results in a week or so in diarrhœa, and then death soon supervenes. While eating the lower jaws work away steadily with a lateral in and out motion, and all the time the antennæ keep moving, examining every bit of food just before it enters the mouth. The females seem always ready to eat, but the males (in the early summer in Bangkok) suffer much from sexual excitement, refuse to feed and become very pugnacious.

In the jungle near Hinlap, 700 feet elevation, in the Dong Phya Phai, Siam, I obtained three specimens of a *Thyropygus*, *T. bowringii* or an allied form, in November 1897. A male was 195 mm. in length, a female 180. The female rolled up quietly when picked up, the male struggled hard, rearing its head up off the ground and trying to bite.

10. *Thyropygus sp.*

At about 300 feet elevation on Bukit Timah, Singapore, on the 19th Jan. 1896, I found one crawling among dead leaves in the jungle at midday. It was about 9 inches in length (230 mm.) I have also found large Thyropygi in Johore, from near sea-level near Johore Bahru, to 1000 feet elevation on Gunong Pulai.

11. *Thyropygus sp.*

Another species of this genus I have found very numerous on Penang Hill from 2200 to 2500 feet elevation; it reaches 4½ inches in length (114 mm.). Its colour, when alive, is as follows: upper parts dark olive brown, with transverse bands of lighter and darker brown, there is a pale yellowish-brown vertebral line, which interrupts the narrow dark brown bands but not the wider paler bands. The lower parts and legs are pale reddish yellow.

Family *Spirobolidæ.*

Genus *Trigoniulus.*

Labral peres 2+2. First dorsal plate acutely angled.

12. *Trigoniulus goësii* (Porat).

This small round red Millipede is extensively distributed in the East and West Indies, and has got introduced into conservatories in England. I found it numerous in:—

Singapore; Spring of 1896, October 1897.
Penang; Botanical Gardens, March 1898.
Penang; the Crag, 2260 feet elev., March and Nov. 1899, March 1898.
Perak; Taipeng, May 1898; Kuala Kangsa Pass and Batu Gajah, Dec. 1896.
Kedah; Alor Star, June 1898; and I found an allied species near Kulim, Kedah, in May 1895.

13. *Trigoniulus sp.* The red-legged Trigoniulus.

This species was very numerous in Bangkok during the rainy season from April to August, and was also numerous on Kosichang. In Bangkok in June specimens were observed copulating.

The number of segments of adults varies from 55 to 60. Males reach 74 mm. in length, females 80 mm.

Colour (from life), drawn up from many Bangkok specimens. Head red, except forehead between the eyes which is brown. First segment (behind head), brown, anterior border red, posterior border pale reddish brown. Remaining segments brown, posterior border very pale brown, reddish on the back, yellowish at the sides, underneath (about bases of legs) pale yellow. Tail (*i.e.*, last segment) red, shading to brown at the sides. Antennæ, mouth and legs, red. The red of the head, legs, etc., is a rich brick red. The brown of the body is a dark brown, dull in some lights, in others more grey than brown with distinct purple shades in it. In spirits the whole colouring becomes darker and less conspicuous. At any rate, in some cases the males are more purplish-grey in colour, and the females (who are also larger) are more reddish-brown.

14. *Trigoniulus sp.* The blue-green and red Trigoniulus.

Of this very beautiful species, apparently undescribed but allied to *T. caudulanus* of Karsch, I got three specimens in the jungle south of Tahkamen, Siam, on the 19th March 1897. The number of segments varied from 48 to 52, and the largest individual was 64 mm. in length.

Colour (from life). Upper surfaces and sides pale bluish bottle green, each segment with a broad, distinct, black transverse band; along each side is a very narrow black line enlarged into a black spot on each segment; from the eighth segment to the penultimate one the back is bright brick-red; this red line is narrow anteriorly and gets broadest about the middle of the back. The head between the eyes is darkish French grey; the remainder of the head, anterior border of the segment next behind the head, the whole of the legs, and the last segment and tail are bright brick-red, the lower surface of the body (between the legs) is yellowish-red.

Genus *Spirobolellus*.

Labral peres 4+4. First dorsal plate very large, expanded laterally.

15. *Spirobolellus sp.* The white-legged Millipede.

This elegant, elongated Millipede, with its conspicuous little white legs, is one of the most active members of the Class.

We found it fairly common at Pachim in March and April 1897, and in Bangkok in May, June and July. This species is particularly addicted to walking up the vertical walls of houses at night.

I also obtained a species of *Spirobolellus* in Singapore in 1896.

Sub-order *Polydesnoidea.*

The Flat-Millipedes are distributed all over the habitable world. They attain to a length of 5¼ inches (134 mm.), the number of segments is always 19 or 20. They have no eyes. The pedal laminæ are united to the terga. The large platelike processes springing from the sides of the segments easily distinguish these Millipedes from those of the other sub-orders.

Family *Platywhachidæ.*

Millipedes of large or medium size, in which the body is composed of 20 segments, each segment except the first and last being furnished on each side with a large, more or less square and horizontal plate, which bears the scent-pore; they occur in tropical America and Asia, and attain a length of 134 mm.

16. *Acanthodesmus pinangensis*, Pocock. A. + M. N. H. Ser. vi 1897, vol. 20, p. 433, Fig. 6 + 6a, p. 431.

The type specimen, a male, was obtained by Mr. H. N. Ridley; subsequently in March 1898, I also caught a specimen at 1300 feet elevation on Penang Hill.

17. *Acanthodesmus perakensis*, Pocock l.c.s. p. 434, Fig. 7, p. 431. Obtained in Perak by Mr. J. H. Leech.

18. *Acanthodesmus petersii*, Pocock, l.c.s. p. 434, Fig. 8, p. 431.

The type species, a male, is from the Malay Peninsula.

19. *Acanthodesmus lineatus*, Pocock, l.c.s. p. 434, Fig. 9, p. 431.

This specimen was discovered by Mr. H. N. Ridley in Singapore.

When in the Larut Hills in April 1898 I collected a large series of Millipedes of this family, representing two hitherto undescribed species of *Acanthodesmus*, and two species of a new genus allied to *Acanthodesmus*; all the specimens being now in the British Museum I am unable to describe them here. Every individual (thirteen were collected) of one species of *Acanthodesmus* had a faint but distinct and pleasant smell, like "vanilla" or "bitter almonds." These Millipedes are all very slow in their movements and easily caught.

20. *Practodemus ridleyi*, Pocock. l.c.s. p. 438.

The type specimen, a female, was obtained by Mr. H. N. Ridley in Singapore. Another species of *Phractodemus*, *P. subrittatus* (Peters) has been recorded from the island of Singa.

21. *Anoplodesmus* sp.

I found one specimen of this genus on rotten wood in the Botanical Gardens, Penang, 21st Nov. 1896. Colour, upper parts shiny black, protuberances at sides bright yellow. Lower surface and legs, reddish brown.

Family *Strongylosomatidæ*.

Millipedes of small size, reaching 35 mm. in length, occurring in tropical America, Africa and Asia, and also in Europe (England).

22. *Orthomorpha coarctata* (Saussure).

A widely distributed species in the East Indies, I have met with it in Singapore, Kedah and Bangkok. In the latter place during the month of May, June and July I had opportunities of watching the development of individuals. The smallest I got were 2 mm. in length, cylindrical in section, had 19 segments, were covered with fine bristles of hair and were *pure white* in colour, except for a pair of reddish-brown spots above the base of the antennæ. As the animal grows the hind portions become dark first, and upper greyish brown, then the head and forepart become a reddish-brown, the centre portion gradually following suit; these changes of colour will be observed in animals of from 8 to 12 mm. in length. In individuals of 10 mm. long the body is still cylindrical but the lateral processes are becoming pronounced, and the general colour is now *pale yellow*, the dorsal plates being pale reddish brown; there is also a reddish-brown patch on the head at the base of the antennæ. The whole Millipede is still sparsely clad with hair, but the hairs are less numerous and much shorter in proportion to the bulk of the animal than in the 2 mm. stage. When the Millipede is about 18 mm. in length all the upper surface is a *rich dark-reddish brown*, the sides are a paler reddish brown, and the underneath, legs, antennæ, tail and lateral processes are bright yellow. The whole animal looks neat and glossy, there are scarcely any hairs on the body except a few large ones under the tail, and many very short, fine hairs on the head, antennæ and legs; and it is at this period that the body becomes slightly depressed.

I observed this species in copula in Bangkok in May 1897, the males seem rather smaller than the females when they clasp by the forepart of the body, and suffer themselves to be dragged along.

23. *Orthomorpha Vicaria*, Karsch.

I found large numbers of this species on the walls of the Government Rest House, Kuala Kangsa, Perak, 10th Dec. 1896.

24. *Orthomorpha crucifera*, Pocock.

This species known from the Mergui Archipelago probably also occurs in Penang; I have collected Millipedes, apparently referable to it, on rocks near "the Crag," 2263 feet elevation above sea, in March and November 1896. Specimens reached a length of 33 mm. (1¼ inches); and their colour in life was, upper parts reddish brown, with dark brown centre line, and narrow transverse dark brown lines, three on each somite, one being central and two marginal. The lateral processes are rich very dark brown, their backward projecting spines being yellow. Sides of body very dark brown, underneath of body buff. Legs yellow.

25. *Orthomorpha gracilis.*

I got one specimen at Ayuthia; February 1888.

Other specimens, some probably representing other species of *Orthomorpha*, I have collected at Chantaboon, Tahkamen and in the Larut Hills of Perak up to 4000 feet elevation, but the most noticeable was a *black and scarlet* form I found in the jungle near Muok Lek, Dong Phya Phai, Siam, in November 1897

IV. Class Symphyla.

Family *Scolopendrellidæ.*

Scolopendrella sp. incert.

In May, June and July 1897, I found Scolopendrellæ very numerous in the Wang Na Garden at Bangkok; they could usually be found under flower-pots. They were most elegant little creatures, about 5 mm. in length (not including the antennæ), very active, and required careful catching to get them alive and undamaged. We found the best way was to drive then into a test-tube by means of a camel-hair paint brush.

They were pure dead white in colour when alive.

The antennæ are long, slender and conspicuous; they usually resemble a row of beads threaded on a string, but in one specimen I examined the left antenna was normal and consisted of 23 bead-like joints, but the right antenna was less than half as long, apparently unjointed, enlarged and rounded at the tip and covered with distally directed hairs (unlike the hairs on normal antennæ which radiate from the centre of each "bead"). These little animals can suspend themselves in the air by a silk line, after the manner of spiders.

On the 22nd November 1897, I found a *Scolopendrella* under a log in the jungle near Muok Lek, in the Dang Phya Phai.

V. Chilopoda.

The Centipedes, Class *Chilopoda*, are invertebrate animals found in all temperate and tropical regions, carnivourous, active and capable of giving a poisonous bite. Some are nearly one foot (305 mm.) in length.

Head. The head is distinct and has a pair of elongate antennæ in front and four pairs of jaws on its lower surface. The 4th pair are large and powerful and project forward below the other pairs of jaws, so as to more or less conceal them from view. The last segment of this 4th pair forms a long fang with a minute hole in the tip, through which the poison is exuded.

Body. The body is elongated, very flattened in section and consists of from 15 to over 121 segments all much alike in structure.

Legs. The legs start from the sides of the lower surface of the body, there is only one pair to each segment, the last pair of legs is generally longer than the rest. The number of pairs of legs is invariably odd.

Native Names for Centipedes.

Malay,	"*Halipan*" or "*Lipan.*"
Siamese,	"*Takhāp.*"

Centipedes are divided into two sub-classes :—

1st. ANARTIOSTIGMA.

1. *eyes*, large, compound, faceted.
2. *antennæ*, widely separated at base, very long, thread like.
3. *body*, composed of 15 segments, but only 8 dorsal plates, all of which, except the last, are furnished in the middle of the hinder border with a single large respiratory stigma.
4. *legs*, very long, their tansi composed of a large number of minute segments.
5. basal-segments of poison-jaws not united.

Length of head and body (exclusive of antennæ and legs)* reaches over 2 inches (or 55 mm.) contains only one genus *Scutigera.*

2nd. ARTIOSTIGMA.

1. *eyes*, simple ocelli, or entirely absent.
2. *antennæ*, shorter, stouter and not thread-like.
3. *body*, composed of from 15 to over 121 segments, each having its own dorsal plate; the stigmata are arranged in pairs and open on the sides of the body.
4. *legs*, of moderate length, usually tipped with a claw.†
5. basal-segments of poison-jaws united to form a coxal plate. Length of head and body (exclusive of antennæ and legs) reaches over 11 inches (or 281 mm.) divided into three orders, with many families and genera.

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* These dimensions only refer to the largest specimens I have myself measured; they may grow larger.

† In the family *Cermatobiidæ* (Order Lithobiomorpha), known from a single species from Halmahira, the tarsi of the legs are many jointed. *Vide* Pocock, Royal Nat. Hist. vi., p. 205.

Sub-class *Anarstiostigma.*
Order *Scutigeromorpha.*
Family *Scutigeridæ.*

1. *Scutigere longicopnis*, Fabr. The long-horned Shield-bearer.

Localities. I have met this fine species in three localities, in each case under quite different circumstances. One was inside a rotten, fallen tree-trunk near the foot of Gunong Pulia, Johore, 13th September, 1897. One I found at night on the outside wall of my house in Bangkok, on the 27th February 1897. And on the 28th June 1898, I saw large numbers of the Centipedes, perhaps 30 or 40 individuals in less than two hours, in deep caverns (where no daylight ever penetrates) of the Batu Caves, near Kuala Lumpur, Selangor; these were easily caught in forceps, if one picked them up as soon as the torch-light showed them, but once disturbed they did not give a second chance of being captured but ran along the wall at immense speed. This species occurs in Java, as well as in Siam and the Malay Peninsula.

Colour (of Bangkok specimen mentioned above).

Upper surface of body moderately dark brown, at the posterior end of each dorsal plate is a double spot of light yellow (very distinct in life). Head yellowish brown with dark brown markings. Antennæ uniform yellowish brown. Legs yellow with narrow bands of dark bluish-grey. Lower surface of body pale yellow. In life the whole animal is slightly iridescent.

Size.	*Bangkok specimen.*		*Batu Caves specimen.*	
Length, head and body	32 mm.	or 1.28 inch.*	55 mm.	or 2.16 in.
,, antennæ	64	,, 2. 5	88	,, 3.46
,, hind-legs	70	,, 2.75	187	,, 7.36
,, from tip of antennæ to end of hind-legs	164	,, 6. 4	325	,, 12.75

2. *Scutigera birmanica*, Poc. The Burmese Shield-Bearer.

Localities. On the 16th March 1896 I caught two specimens at the "Crag," Penang Hill, elevation 2260 feet; and subsequently in March 1898 obtained a third specimen at the same place. They are exceedingly active, running so fast that unless you know them by sight it is hard to tell what sort of animals they are; if found at rest they may be picked up with a pair of forceps or else made to walk into a wide-necked cyanide-of-potassium bottle, but if first frightened all you will probably see of them is a glimpse of (apparently) a spider with an improper number of very attenuated legs disappearing round the corner. It is very difficult to secure a perfect specimen, as when caught they seem to shed their legs voluntarily, almost as if to spite the collector.

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* End of body projects 2 mm. beyond base of hind legs.

District. Burma and Penang.

3. *Scutigera marmorea*, Poc. The Marbled Shield-Bearer.

Localities. On the 14th March 1896 I caught one specimen under the bark of a tree at "Richmond," Penang Hill, elevation about 2300 feet; its general colour was reddish-brown. In March 1898 I got another specimen also on Penang Hill at nearly the same height above sea-level.

District. Burma and Penang.

Sub-class *Artiostigma.*

1st Order, LITHOBIOMORPHA. 15 pairs of legs.

Contains only the Family *Lithobiidæ.* Species of *Lithobius* are known to occur in Java, Sumatra, Burmah and possibly the Nicobar Islands, so will probably be eventually found in the Malay Peninsula; the largest of the known S. E. Asian forms is only 12½ mm. long.

2nd Order, SCOLOPENDROMORPHA. 21 or 23 pairs of legs.

Eyes, either absent or consist of 4 ocelli on each side of the head.

Antennæ, 17 to 29 segments.

Divided into several families.

The usual centipedes met with in Malaya and Siam all come into the family *Scolopendridæ*, which have 21 pairs of legs, 4 eyes on each side of head, and reach nearly a foot (305 mm.) in length.

3rd Order, GEOPHILOMORPHA. 39 to 161 (or possibly more) pairs of legs.

Eyes, absent.

Antennæ, 14 segments.

This order consists of long, thin, worm-like centipedes; some species are at times luminous; they are divided into several families, and individuals reach 130 mm. in length.

Order *Scolopendromorpha.*

Family *Scolopendridæ.*

4. *Scolopendra subspinipes*, Leach. Common Centipede of S. E. Asia.

Localities. Of this species I got several specimens in Penang both from near sea-level (Sepoy Lines) and from the hill ("Crag"), one in Singapore, one in Johore Bahru, one in Bangkok, and one received from Sourabaya, Java: it also occurs in Sumatra and Flores, and is found (possibly introduced) in tropical Africa and in the West Indies.

Colour. Most individuals I have seen were bright reddish brown, but the Johore specimen (mentioned above) and one from Penang Hill were purplish-black above, pale reddish-brown below and had reddish antennæ and legs.

Size. The red and the black individuals seem to attain equal dimensions, the largest I have measured was in length (exclusive of antennæ and hind-legs) 166 mm. or 6½ in.

5. *Scolopendra de haanii*, Brandt. De Haan's Centipede.

This may be only a variety of *S. subspinipes* from which it differs in the absence of spines from the under surface of the anal femora.

Localities. I got several specimens from the hills of Penang, at about 2300 feet elevation; one from Batu Gajah, Perak; four from Kulim, Kedah; and about thirty from the following places in Siam—Bangkok, Ko-si-chang, Chantaboon, Kabin and Muok Sek, in the Dong Phay Phai: it also occurs in the Mergui Archipelago, Java and Sumatra.

Colour (from life.) Above rich reddish-brown, antennæ paler reddish-brown; legs pale yellow, distally dark reddish-brown, claws black; hind-legs reddish brown, getting darker distally, last segments nearly black; underneath of head reddish brown, last joint of poison-fangs black; lower surface of body brownish yellow.

A young specimen from Kabin was black with orange-red legs and a broad orange-red band behind the head.

A centipede 53 mm. (say 2 inches) in length (excluding antennæ or hindlegs), which Pocock considers to be probably the young of this species, had the upper parts reddish-brown, but the posterior part of each segment very dark, nearly black; the antennæ, head and first two segments of body olive green; legs on remaining segments pale red; and the under surface pale reddish-brown.

Size. The finest De Haan's Centipede I have measured was caught in our compound in Bangkok, 19th December, 1897. Its dimensions were:—

Total length, from tip of antennæ to claw of hind foot	281 mm.
Length, without antennæ or hind legs	210
,, antennæ	38
,, hind-leg	35
Width, 2nd segment	16
,, 15th ,,	17
,, 21st ,,	15
,, 22nd (last)	11

These two species, supposing them to be distinct, seem similar in habits; they are for the most part nocturnal, but I have met them roaming abroad in the day time; they are to be found in houses and gardens as well as in the jungle, and even on board ship. They run very swiftly, and try to bite fiercely when interfered with; what the effect of their bite on a man could be I do not know, I only once saw one bitten—Surgeon-Captain Smith at Penang in 1895. He felt no ill effects from the bite, but the centipede had previously been biting at some cord, in a loop of which we were trying to secure it, so had probably exhausted its supply of poison. It is said that their claws are poisonous, and I have even been told in Singapore that a centipede ran over a man's face and left a line of bad sores where its feet touched his skin. I cannot believe this—for I have seen Malays allowing a big centipede (with poison fangs extracted) to run about their bare shoulders and neck without recieving any harm, and I have myself had them crawling over my hands as an experiment but without being able to see, or feel, the smallest wound. Nothing seems to be known about their breeding habits. In Penang I have seen a dead centipede hung from the front axle-tree of a gharry; why this is done I have no idea; perhaps other members of the Society have noticed this?

6. *Scolopendra Morsitans* (Linn.) The Biting Centipede.

I caught specimens of this species at Gunang Pulai in Johore, and at Kabin in Siam, received one from near Raheng, Siam. The Kabin specimen was purplish-green in colour, and measured in length (without hind legs) 71 mm. (with hind legs) 82⅓ mm. Dr. Max Weber obtained this species in Celebes, Saleyer and Flores. It is also found in central Africa and other tropical countries.

7. *Otostigmus scaber*, Porat. The Rough Centipede.

"Takhāp-fai" (fine-centipede) of the Siamese.

Localities. I found this species numerous in Bangkok under flower pots in the garden of the Wang Na, and also got specimens on Gunong Pulai, Johore.

Colour (Bangkok specimens). Above reddish-brown, redder on the margins, browner in the vertebral line; the anterior portion of the head sometimes black; lower surface of body pale reddish-yellow; eyes black; antennæ light-red or else basal portion reddish-brown, turning darker distally till the tips are almost black; legs, basal segment and greater portion of next segment buff, remainder rich dark blue, or in some specimens the legs are grey, basally bright blue, distally buff, the hindmost pair of legs are blue banded with pale buff or white at the joints.

Size (Bangkok specimens). The largest I noted measured 48 mm. in length, without including the hind-legs.

Another was :—

length, without antennæ or hind legs,	31½	mm.
,, antennæ	9	,,
,, hindlegs	12½	,,

I also collected specimens of *Otostigmus* on Penang Hill, in the Larut Hills of Perak, in Johore, at Chantaboon (purplish-blue in colour) and at Paknam-Menam, which are difficult to determine specifically, as there are many species of this genus described from Ceylon, Japan, China, Mergui Archipelago, Sumatra, Java, Borneo, Celebes, Flores, etc.

8. *Rhysida longipes* (Newport).

I got two specimens at Tanglin, Singapore, one found under a flower-pot, one running about in my bathroom at night, and several from Siam, from near Raheng and from the island of Ko-si-chang. This centipede usually has its back coloured dark reddish or purplish-brown, the legs may be lighter; it is of small size reaching a length of 68 mm. (2.68 inches). It is distributed in many parts of tropical Asia and America.

9. *Rhysida immarginata* (Porat).

Of this small species I got six specimens near Alor Star, Kedah; one in Taipeng, Perak; a friend found it climbing up his leg inside his trowsers; and two in Singapore, one in the Officers' Mess, Tanglin, and one in a bathroom of Raffles Hotel. In these centipedes the antennæ, when not in use, are carried curled up very elegantly. Dr. Max Weber obtained this species in Sumatra, Java and Saleyer.

10. *Rhysida carinulata* (Haase.)

In January 1896 Mr. Ridley and I found one of these rare centipedes on Bukit Timah, Singapore; it was a female lying curled up round its eggs, hidden under a rock in the jungle. The species was previously known from Celebes.

11. *Rhysida rugulosa*, Pocock.

This species is described and figured (nat-size) by Pocock in Max Weber's Zool. Ergebnisse III, p. 314, Pl. xix, Fig. 6. The type specimen is from Sumatra. In November 1896 I caught one in the garden of "the Crag," Penang Hill, 2200 feet elevation; its colours were:—back purplish black; antennæ and legs bottle green; underneath pale olive green. Length (excluding antennæ and hind feet) 85 mm. (3.33 inches.)

I also got specimens of *Rhysida* from Blakan Mati, Singapore, and from Chantaboon, that apparently do not fall into any of the above species.

Order *Geophilomorpha.*

Family *Geophilidæ.*

12. *Orphnæus brevilabiatus* (Newport). The Luminous Centipede. Malay *Klamayer.*

I have caught this long, thin red centipede at Tahkamen, Siam, in March 1897, in Government House, Singapore, October 1897, and in Bakar Bata House, Kedah, in May 1898; always in roofs or upper stories of houses. On more than one occasion, I have seen them at night on my mosquito curtains. Each time I tested their luminosity; when disturbed they give out a bright but lurid green "phosphorescent" light, and as the centipede moves it leaves a trail of light behind it on the surface it is crawling over; this trail glimmers for a moment or so, and then goes out.

Besides Siam and the Malay Peninsula this species occurs in other parts of the Oriental Region (Mergui Archipelago, Java, Celebes, Flores, etc.) and also in tropical America.

Family *Dicellophilidæ.*

13. *Mecistocephalus punctifrons*, Newport.

Of this long, thin centipede I got four specimens in the earth at Chantaboon in January 1898 (no luminosity observed), and also found a single individual under a piece of wood on the top of Western Hill, Penang, elevation 2725 feet. This latter measured:—

length (excluding antennæ and hind legs) 52 mm.
,, (including ,, ,, ,, ,,) 63 mm.

This species is also recorded from the Mergui Archipelago, Sumatra, Java, Flores and Mauritius.

Family *Eucratonychidæ.*

Species of *Eucratonyx* may eventully be found in Malaya as they occur in Burmese territory on the one side, and in islands at the Eastern end of the Malay Archipelago on the other.

VI. Class Gigantostraca.

Order *Xiphosura.*
Family *Limulidæ.*

The King Crabs, or Horse-shoe Crabs.
"*Mengdahn-nām*" of the Siamese.
"*Belangkas*" of the Malays.

1. *Limulus moluccanus.*

I have got live specimens in the Singapore Market on the 5th April, in the Bangkok Market 18th June, and in Brunei, Borneo, on the 2nd October.

I was told in Siam that the King-Crabs usually frequent deep water, but in June, July and August resort to the shallows at the head of the Gulf for breeding purposes; they are then caught in large numbers for the markets. They will live for a few days in a tub of fresh water.

In life the carapace is a beautiful, rich, dark, shining, olive colour.

The largest specimen I measured (at Bangkok) was:—

Total length,	19.7	inches.	= 500	mm.
Length of carapace,	10.2	,,	= 259	,,
,, ,, tail,	9.5	,,	= 241	,,
Width, ,, carapace,	10.2	,,	= 259	,,

2. *Limulus rotundicauda.*

Easily distinguished from *L. moluccanus* by the round shaped tail.

To be seen for sale in the Bangkok Market with the above.

The largest specimen I measured (at Bangkok) was:—

Total length,	15.25	inches	= 387	mm.
Length of carapace,	8	,,	= 203	,,
,, ,, tail,	7.25	,,	= 184	,,
Width ,, carapace,	7.75	,,	= 197	,,

3. *Limulus tridentatus*, Leach.

Also known as *Limulus longispinis.* Mr. A. C. Cluneis Ross gave me a large pair caught at Kudat, Brit. North Borneo: the female was the largest and measured:—total length 35.25 inches =894 mm., width of carapace 15 inches = 381 mm.

VII. Class Arachnida.

In this class are included the Spiders, Scorpions, Mites, Ticks and their relatives.

These animals have no distinct head, the head and thorax being fused together, and the result of this union (called the "cephalothorax") and the abdomen may or may not be segmented.

Breathing is carried on by air-tubes, lung-books or both.

The sexes are distinct individuals.

There are no antennæ, such as exist in the insects, centipedes and millipedes.

The cephalothorax bears six pairs of limbs;—

1st pair (the mandibles) composed of 2 or 3 segments, acting as seizing or biting organs.

2nd pair (the cheloe, or palpi) composed of 5 or 6 segments; of which the basal segments (the maxilloe) are used for crushing food, and the remainder variously modified as seizing, feeling or sexual organs.

3rd pair, composed of 6 or more segments, used for feeling (as in the Pedipalpi), or for walking.

4th, 5th, and 6th, composed of 6 to 9 segments, used for walking.

The abdomen bears no true limbs.

The class may be divided into 8 orders, one of these contains the Mites, Ticks and a varied host of small forms, some very degenerate, in some various limbs are lost, in some there are apparently no organs of respiration, and in the "Water Bears," or *Tardigrada*, the sexes are not distinct but are united in each individual.

The following table may be of use to the collector in determining to which Order an Arachnoid beast, he may happen to have caught, belongs.

A. 2nd pair of limbs modified into great seizing organs (cheloe).
  A. no "waist" between caphalothorax and abdomen.
    3rd, 4th, 5th and 6th pairs of limbs of similar construction and used for walking.
    a. posterior segments of abdomen narrowed, forming a distinct jointed tail, ending in a poison-sting.

breathing by means of 4 pairs of lung books.
abdominal combs present.
no silk-secreting glands.
some species attain a length of 8 inches.

(Scorpions). Order *Scorpiones.*

b. no tail.
breathing by means of air-tubes.
no abdominal combs.
silk-secreting glands present.
some species attain a length of $\frac{1}{4}$ inch.

(False Scorpions). Order *Pseudoscorpiones.*

B. a "waist" between cephalothorax and abdomen.
3rd pair of limbs modified into feelers, the last segment being clawless and divided into a number of secondary segments.
4th, 5th and 6th pairs of similar construction and used for walking.

c. no tail, or a thread like one.
breathing by means of 2 pairs of lung books.
no abdominal combs.
no silk-secreting glands.
some species attain a length of 2 inches.

(Whip Scorpions) Order *Pedipalpi.*

B. 2nd pair of limbs not modified into chelœ.

C. cephalothorax segmented.
mandibles form large pincers.
abdomen with ten segments.
palpi leg-like.

d. a long jointed tail.
size minute; only one species known, from South Europe.

Order *Palpigradi.*

e. no tail.
reach nearly 2 inches in length; many genera and species known from South Europe, Africa, Asia and America.

(False Spiders). Order *Solifugæ.*

D. cephalothorax not segmented.
  f. a "waist" between cephalothorax and abdomen.
    mandibles form a poison fang.
    abdomen not segmented (except in sub-order Mesothelœ).
    breathing by means of 2 pair of lung books, or else 1 pair lung books and 1 pair of air-tubes.
    spinning glands present.

(Spiders). Order *Araneæ.*

  g. no "waist" between cephalothorax and abdomen.
    a.′ abdomen composed of 3 to 8 segments.
      mandibles pincer-like.
      basal segment of 3rd pair of limbs always adapted for mastication.
      breathing by means of air-tubes.
      no spinning glands.

(Harvest Spiders). Order *Opiliones.*

    b.′ abdomen not segmented.
      mandibles pincer-like, or simply pointed.
      basal segment of 3rd pair of limbs never adapted for mastication.
      breathing by means of air-tubes, or without distinct organs.
      spinning glands sometimes present.
      size usually minute.

(Mites, Ticks etc.) Order *Acari.*

Order *Scorpiones.*

The True Scorpions.

Malay "*Kalajinking.*"

Siamese "*Malaang-pon,*" or more commonly "*Meng-pon.*" Pantang Kapur "*Simpai,*" and "*P'nîpet,*" (Lake—Kelsall, J. S. B. R. A. S. No. 26, 1894, p. 41.)

The true Scorpions have four pairs of legs, of similar construction, each composed of seven segments, and used for locomotion, and two modified anterior pairs of limbs, one (the chelæ) forming great pincers and composed of six segments, and one (the mandibles) forming small pincers and composed of only three segments.

The abdomen is distinctly segmented, and the last six segments are narrower than the rest, forming a distinct tail; the last segment of all (the telson) ends in a sharply pointed poison-sting.

On the lower surface of the second segment of the abdomen are a pair of comb-like organs (the pectines); the exact use of which does not seen to be known, but I have noticed scorpions are continually moving them about as if they were organs of touch.

Scorpions are divided into several families; two of which occur in our region and may be thus distinguished:—

1st. *Buthidæ.* Sternum of the cephalothorax small and triangularly pointed in front.

Two spurs on the articular membrane of the tarsus.

2nd. *Scorpionidæ.* Sternum of the cephalothorax broad and pentagonal.

One spur on the articular membrane of the tarsus.

Family *Buthidæ.*

1. *Archisometrus mucronatus* (Fabr.) The Sharp Scorpion.

"*Mengpon tahkepp*" of the Siamese.

This small yellowish scorpion is widely distributed in the East, being recorded from Burma, Siam, Cambodia, Cochin China, China, Japan, Philippines, Sumatra, Java, Flores, Saleyer, and it is said from New Zealand and Madagascar. Pocock has given an excellent coloured figure of this species, natural size in Max Weber's Zool. Ergebnisse III, Pl. vi, fig. 1, (published at Leyden, 1893.)

Scorpions of this species are to be found inside and outside houses, both downstairs and upstairs, as well as in gardens and in the jungle; they spend the day hidden in crevices, or under stones, rocks, etc., and at night roam about for food; they run about the walls of houses with ease, but I doubt their being able to cross ceilings, as the house-lizards of the family *Geckonidæ* do.

In Bangkok I found this species very common, and also caught specimens at Ayuthia, in the Dong Phya Phai, at Kabin, at Chantaboon and on the island of Ko-si-chang.

When suddenly found under a stone they seem to seek safety rather in remaining perfectly motionless than in taking instant flight.

I have noticed them eating crickets and moths, possibly they will eat any insects they can catch and overpower, but I have watched them encounter and leave unmolested, though hungry, a beetle (*Carabidæ*) and a small green bug. On several occasions I have placed these scorpions with whip-scorpions (*Thelyponus sckimkewitchii*) and with large spiders (*Heterapoda venatorea*) to see if they would try to tackle other Arachnida, but I found the three sorts all left one another alone. I have not observed them even attempt to feed on insects they have not killed themselves, nor to pay any attention to fruit. I do not know if they ever drink, I find an entry in my diary for the 26th December, 1897 :—"*A. mucronatus* caught on the 15th of this month is still alive and well. It has had no water all the time." Unfortunately I find no note as to the further career of this scorpion, or how long it lived in captivity. When walking this species ofter has the combs extended and pointed forward. It seems quite blind (at any rate in a full light), it runs swiftly with both chelæ extended, but if an upright thing, such as a stick which the chelæ pass on each side of without touching, is met with, the scorpion runs right into it and is pulled up short; just as a man feeling for the door in the dark with outstretched arms may, if the door be standing open, suddenly find himself hit in the face by it; but on the other hand I have seen a scorpion pursue a fluttering insect, but this may have been by sound (or smell ?).

The following extract from my diary of the 15th December 1897 will give some idea of how these animals feed.

A. mucronatus; in the evening I watched it sitting quite still, body very flat on the ground, chelæ extended, tail curved over back with the point of the sting carefully protected in the usual manner; a small moth settled near it, the scorpion immediately seized the moth in both chelæ and quick as lightning brought its tail over its head, stung the moth and recovered its tail to the 'rest' position, it then placed the moth's head to its jaws and ate it off, holding the moth in its chelæ and tugging off pieces with its mandibles; aftera few bites the scorpion ran off holding the moth in one chelæ; on the way another small moth came just by it, the scorpion promptly seized it in the disengaged chelæ, and again quick as a thought its tail was thrown forward and again withdrawn; it then ran on with a moth in either hand, when it met a third moth the scorpion transferred the first moth to its mandibles and with the chelæ thus disengaged it attempted to seize the live moth but it fluttered on; the scorpion, pursuing with one moth in its jaws, one moth in one hand and the other hand grabbing at the third moth, was decidedly comical; it failed to catch the third moth, and after running a little way settled down to eat its captives; the first moth was eaten wings and all, only one lower wing and four legs being left, which may have been dropped accidentally, it then began eating the second moth but after a time (whether anything frightened it or not I do not know) the scorpion dropped the moth and ran off; after some minutes another live moth came in its way which it seized and commenced eating; while doing so it caught another, and again ran off carrying one moth in its jaws and one in its hand."

Effect of Sting.

Two cases of scorpion sting have come under my notice; each time the scorpion was caught and identified as *Archisometrus mucronatus.*

1st. 27th Nov. 1897. Basdeoh, a native of India, accidentally put his hand on a scorpion which stung him in the finger; he said he had very great pain all up the hand and arm as far as the shoulder; he applied a small native poultice which somewhat relieved the pain. This happened at 6 a.m. At 7.30 a.m. the finger was very swollen, but not appreciably discoloured, he said there was then no pain above the elbow but it was very bad in the forearm and hand; we got him to put the injured finger in a strong solution of permanganate of potash and keep it there for half an hour, first opening the wound by squeezing it; by 8.30 a. m. he was all right again.

2nd. 26th December 1897. Maa Deng, Siamese woman, stung in her foot in the evening; the effect was at once a rather swollen foot and much pain: we were able to bathe the foot almost immediately in a very strong solution of permanganate of potash and the pain subsided in a quarter of an hour.

Colour.

Yellow mottled with brown, the four pairs of breathing orifices on the abdomen being very conspicuous as lemon yellow spots. A small specimen (36 mm. in length) was coloured pinkish underneath.

Young.

I have not been able to make out at what times of year these scorpions breed. On the 9th May in Bangkok I caught a young one (10 mm. in length) by itself, and on the 3rd August also in Bangkok found one (11 mm. in length) being carried about on its mother's back.

Sexes.

Mr. R. J. Pocock, in answer to enquiries, writes to me: "In *A. mucronatus* the male has the tail stouter and the claws longer with sinuate fingers, as compared with the female."

Size.

Length from front of mandibles to tip of sting of 38 adult Siamese specimens which I have examined:—

average 44½ mm.	smallest, 36 mm.
largest, 55 mm.	(roughly 2¼ inch.)

Pectinal Teeth.

Usually about 21 on each comb, occassionally there is one more tooth on one side than on the other, and once I found a specimen with two more teeth on one side than the other i. e. 19 and 21.

The fewest I have counted were in a Bangkok specimen, i. e. 18 and 18: the most I have counted were in a Dong Phya Phai specimen, i. e. 24 and 24.

2. *Archisometrus scutilus*, C. K.

This is is a small yellowish-brown scorpion with very long attenuated claws and tail; I caught one specimen under the bark of a fallen tree in the Experimental Gardens, Penang Hill, about 1900 feet elevation, and one in the verandah of "the Crag," Penang Hill, 2260 feet elevation, both in March 1898. This species is also recorded from Tenasserin, Selangor, Singapore, Sumatra and Java.

3. *Isometrus maculatus* (De Geer).

This is another small yellowish brown scorpion; it has been found in Spain, Africa, India, Ceylon, Malay Peninsula, Siam, Hongkong, Java, Timor, Mauritius, Madagascar, Sandwich Islands, West Indies and South America. I caught two specimens in the Officer's Mess, Sepoy Lines, Penang; one in the Officer's Mess, Tanglin, Singapore; one in Raffles Hotel, Singapore; and two in Bakar Bata House, Kedah. I was given two specimens in Bangkok said to have been caught there, but I never myself came across it alive in that city. This species, when suddenly found, will often lie still as if feigning to be dead, till touched, when it tries to run away.

Sexes.

"In *I maculatus* the tail and pincers of the male are very long and thin as compared with the female." Pocock.

Family *Scorpionidæ.*

4. *Chærilus agilis*, Pocock. The Agile Scorpion.

This species was discovered by Mr. H. N. Ridley at the Batu Caves, Selangor, and described by Mr. R. J. Pocock (Annals + Mag. Nat. Hist. Series vii, vol. iii, No. 17, May 1899, p. 416). The general colour is dark reddish brown, not distinctly variegated. Pectinal teeth 4. Length 56 mm.

5. *Chærilus rectimanus*, Pocock. The Straight-handed Scorpion.

Mr. H. N. Ridley discovered this species in Singapore, and it has been described by Pocock (loc. cit. supra, p. 418).

The general colour is ferruginous, variegated with black.

Pectinal teeth 3 (?). Length 24 mm.

Other species of this genus will probably be eventually found in the Malay Peninsula.

6. *Palamnæus oatesii*, Pocock. Oates' Scorpion.

This large species, known as "Kala" by the Kedah Malays, is often identified as *Palamnæus spinifer* (Hempr. + Ehrenberg). L. Wray, jun., J. S. B. R. A. S. No. 21, 1890, p. 148, mentions "a large dark metallic green scorpion (*Buthus spiniger*)" in Batang Padang, Perak; he probably refers to this species.

I obtained one specimen from near Jenan, Kedah; four from Kulim, Kedah; two from Penang Hill (one at 2500 feet elevation, given me by Mr. L. Brown); three from Johore Bahru, and two from the foothills of Gunong Pulai, Johore.

Colour (in life): very rich dark olive green. The poison-vesicles in the Gunong Pulai specimens were white.

Size.

♂. from front of mandibles to tip of sting, 102 mm. Pectinal teeth, 16+17.

♀. from front of mandibles to end of penultimate segment, 107 mm. Pectinal teeth, 17+17.

District.

Burma, Malay Peninsula, Sumatra (?).

7. *Palamnœus silenus*, Simon.

Siamese, "*Mengpon chang*," = Elephant Scorpion.

Of this fine species I obtained four specimens from Bangkok, three from Tahkamen, one from near Kabin, one from near Raheng, and thirty one from Chantaboon. It seems to be strictly nocturnal; at night roaming about for food, and lying hid by day: at Chantaboon I found most by digging in the soil 4 or 6 inches deep, under fallen logs, to find their burrows, which the scorpions often tried to escape along, but we followed them (digging up the soil) and eventually secured them. In one spot (in Jan. 1898) we found about ten individuals, all of about the same size, huddled up close together in a hole in the ground.

Colour (in life.) shining rich dark green.

Size. A good specimen had the following dimensions:—

Length, from front of mandible to point of sting—135 mm. (about $5\frac{1}{3}$ inches).

Length, of cephalothorax (in median line)—18 mm.

Width of cephalothorax	19 mm.
Length of tail	66 —
,, ,, humerus	16 —
,, ,, brachium	16 —
,, ,, pincer (to end of fixed digit)	35 —
,, ,, moveable digit	22 —
Width of hand	16 —

Pectinal Teeth vary in number from about 15 to about 18 on each side.

The usual numbers seem to be 16+16, or 16+17.

Sexes. "In *Palamnæus silenus* and *Hormurus* the male has the two halves of the genital operculum separated so that this can be pulled apart, while in the female, though the suture remains, the two are inseparable. The combs are also larger in the male." Pocock.

District. Siam, and Cochin China.

8. *Hormurus australasiæ* (Fabr.)

Siamese "*Mengpon-ton*" = Tree Scorpion.

This is a small dark brown scorpion with large pincers, a comparatively short, slender tail and a very small sting, commonly to be found under the bark of trees, but I have also obtained it among a pile of logs, and under dead leaves on the ground. Pocock says "this species is found in S. East Asia and all over the Islands of the Indo-Malayan, Austro-Malayan and Australian Region," and mentions it being recorded from the Himalayas, Corea, Sumatra, Java, Flores, Saleyer, New Britain, Solomon, Loyalty and Fiji Islands.

Personally I have caught seven specimens on Penang Hill, at elevations of 1800 to 2300 feet; three in Bangkok; one at Chantaboon; and two on the island of Kosichang. I also received one from near Raheng, Siam.

A *Hormurus*, probably of this species, is found on Maxwell's Hill, Perak; I found the remains of one inside a frog (*Rana macrodon*) caught at 3,300 feet elevation in April 1898.

The largest specimen I have measured was from the front of the mandibles to the tip of the sting, 43 mm.

The pectinal teeth in four Siamese specimens examined were:—6+7, 6+7, 7+7 and 7+7.

Order *Pseudoscorpiones.*

The False Scorpions.

These are the minute and harmless animals sometimes called "Book Scorpions." At Chantaboon I found a species of the genus *Chelifer*; and also in Bangkok under the bark of trees, under flag-stones and in packing cases.

Order *Pedipalpi.*

(see Pocock, Royal Natural History, Vol. vi, p. 217).

Sub-order *Uropygi* (Tailed Pedipalps).

Section *Oxopœi.*

Family *Thelyphonidæ.* (Whip Scorpions).

1. *Thelyphonus skimkewitchii*, Tarnoni.

Siamese "*Mengpon-menn*," i. e. Stinking Scorpion.

Localities. I met this species in Bangkok, Chantaboon and Kosichang. Pocock records it from "Lacan, via Raheng, in Siam" (A.+M. N. H. Ser. 7, Vol. v, March 1900, p. 298).

Description of body from a Bangkok specimen:—

Cephalothorax slightly convex, considerably narrowed anteriorly. The anterior eyes are black, they are separated by a prominent elongated smooth tubercle which extends to the anterior edge of the cephalothorax, which consists of a sharp ridge which curves back on each side as far as the lateral eye where it disappears; the three lateral eyes are pale yellow, the dorsal pair being very conspicuous in the live animal. The whole surface of the cephalothorax is roughly granulated, on the whole more coarsely anteriorly; the cephalic and thoracic grooves are well marked. Abdomen moderately depressed, elongately oval, at its widest part 1/7 wider than the widest part of the cephalothorax; upper surface granular, with the posterior edge of each segment "crenulated"; "the muscular points" are round and well marked on the second to eighth segments.

Colour (in life); drawn up from several dozen Bangkok specimens.

Adults:—Upper surfaces of chelœ, cephalothorax, abdomen, two joints of legs nearest body and lower surface of abdomen very dark brown, almost black, but sometimes the greater part of the lower surface of the abdomen is reddish-brown. Along either side of the abdomen there is a broad pale yellow longitudinal line. The tail, limbs (where not dark brown), lower surface of cephalothorax, and the first two segments on the underneath of the abdomen are a rich red-brown.

Young :—Specimens of about 8 mm. in length have the cephalothorax and abdomen of the usual dark brown colour, but have pale yellowish red chelœ.

Size, of three typical Bangkok specimens, in millimetres ;—

Total length of cephalothorax and abdomen.	28	29	28
Length of cephalothorax,	11	11½	11
,, ,, abdomen, including terminal joints,	17	17½	17
,, ,, the narrow tail,	20	23	26
,, ,, five terminal joints of chelœ, in articulation,	13		
,, ,, first leg, excluding the coxal joint,	35	37	33
,, ,, second leg,		19½	18
Width of cephalothorax,		6½	6

Habits. Strictly nocturnal; hiding by day under logs, stones, etc. and at night roaming about for food. They are chiefly to be seen during the rainy season from April to August. In January and December I have sometimes noticed a very faint and peculiar smell given off by these creatures, but have not been able to detect it at other times of year.

To collect—when found they can easily be picked up by a pair of forceps, the points placed on either side of the hard cephalothorax, and they quickly die in a cyanide of potassium "insect killing bottle." When placed on their back on a sheet of glass or other flat surface these *Thelyphoni* seem very helpless and unable to right themselves.

Food. In captivity they feed readily on dead insects; they first carefully and slowly examine the object, then take it up in their chelœ, and in the case of a moth almost completely devour it, or if a dragon fly eat all but the wings : very rarely I have seen a *Thelyphonus* catch a live insect in its chelœ and eat it : they do not attempt to interfere with beetles or grasshoppers larger than themselves. Besides insects they will eat very small bits of over-ripe bananas.

One that I caught with a broken tail lived 24 days, during this time there was no sign of a reproduced tail growing.

Effects of Sting. These animals are usually supposed to be harmless to man, but in Bangkok on the 30th April 1897 I had a curious experience with one. Seeing a *Thelyphonus*, of this species, running on the ground I picked it up by the cephalothorax between the first finger and thumb of my left hand; it at once bent its thread-shaped tail over its back (as a scorpion does) and also scratched about my fingers with its legs, but the pincers did not touch me; I thought nothing of its tail, etc., till I felt a sharp pain and found the animal *had* somehow stung me. I went straight into my house, and already the first joint of my finger was very swollen and inflamed, there being a rapidly growing white lump, and the rest was red; at one spot was a fresh puncture as if a needle had been driven in, in a horizontal direction, and gone some little way under the skin. After cutting and squeezing the wound, I put my finger into a strong solution of permanganate of potash, which at once relieved the pain and stopped the swelling, but the little wound continued to smart for some hours. Since then I have been careful never to let a *Thelyphonus* touch me.

Sexes. "You can tell the male of this species at once by the presence of a shallow circular pit upon the fourth ventral plate of the abdomen, by the different shape and size of the first plate, and by the simple structure of the small segments of the tarsus of the first pair of legs, that is to say of the antenniform legs; the tarsal segments of the adult female being peculiarly modified." (R. I. Pocock).

2. *Thelyphonus Johorensis.* Oates.

"Toong-gee" of the Malays of Johore.

I have caught this species in Johore Bahru, and up to about 500 feet elevation on Gunong Pulai. One specimen, out of three caught Sept. '97, smelt slightly. Two *Thelyphoni*, probably of this species, caught in the Botanical Gardens in March '98 also smelt slightly but perceptibly. A specimen obtained at about 3400 feet elevation in the Larut Hills, Perak, in April '98, is referred doubtfully to this species.

3. *Thelyphonus wayi*, Pocock (A. & M. N. H. Ser. 7, Vol. v, March 1900, p. 295).

Found by Mr. Herbert W. L. Way in Battambang, Siam.

4. *Typopettis dalyi*, Pocock. (loc. cit. supra. p. 297).

Found by Mr. Mahon Daly at "Lacan, Via Raheng, Siam."

5. *Hypoctonus formosus* (Butler).

This species found in Burma and on Owen's Island, Mergui, (Pocock, Linn. Soc. Jour. Zoology, Vol. xxxvi, p. 316); is probably the same as that recorded from Penang as *Thelyphonus angustus*, Lucas by Stoliczka, J. A. S. B. Vol. xlii, Part 2, 1873, p. 134.

Sub-order *Amblypygi* (Tailless Pedipalps).

Family *Tarantulidæ*.

6. *Tarantula phipsoni* (Pocock) Phipson's Tarantula.

This species is named after the able Honorary Secretary of the Bombay Natural History Society. The genus *Tarantula* has also been called *Phrynus* and *Phrynichus*.

At Chantaboon in January 1898 I found fifteen individuals of this species on one small hill, by turning over some piles of logs; they can run very swiftly, and rapidly efface themselves from view by going into crevices; but usually, like scorpions, they seem to seek concealment by squatting quite still among their natural surroundings. Daylight seems to confuse them, and when caught they move their pincers wildly about in a most aimless manner.

Dimensions of a Chantaboon specimen:—

Length, from front of mandible (folded at rest) to end of abdomen,	40	millimeters.
Width of cephalothorax,	19	,,
,, ,, ,, abdomen,	17½	,,
Total length of chela limb,	110	,,
,, ,, ,, antenniform limb,	128	,,
,, ,, ,, 1st walking leg,	55	,,
,, ,, ,, 2nd ,, ,,	60	,,
,, ,, ,, 3rd ,, ,,	58	,,

Span from tip to tip of outstretched chela, 220 mm.

An animal allied to Phipson's Tarantula inhabits the Batu Caves, Selangor; I saw one specimens far into the caves in June 1898 but failed to catch it.

Order *Araneæ.*

The True or *Web-Spiders*

Malay "*Laba-laba*"

Siamese "*Meng-moung*"

Jakun "*T'wowoh*" (Lake+Kelsall, J.S.B.R.A.S. No. 26, 1894, p. 56.)

The true Spiders have four pairs of legs, of similar construction, each composed of seven segments, and used for locomotion, and two modified anterior pairs of limbs, one (the palpi) leg-like and composed of six segments, including the basal segment or maxilla, and one (the mandibles) composed of only two segments and containing a poison-gland which opens at the tip of the second segment which forms the poison-fang. The spinning mamillæ, upon which open the silk glands, are situated on the lower surface of the abdomen, and are a characteristic feature of the true Spiders.

The sexes of spiders may be distinguished by the last segment of the palp which is modified into an intromittent organ in the male, while the female, in most families, has a horny plate (vulva) on the forepart of the lower surface of the abdomen.

The true Spiders are divided into two Sub-orders:—

1. *Sub-order Mesothelæ.* Abdomen segmented, its upper surface covered with eleven dorsal plates. Eight spinning mammillæ placed in the middle of the lower surface of the abdomen. This sub-order contains only one family *Liphistiidæ*, and one genus *Liphistius*, known from Burma, Sumatra, Penang and Selangor, where it has been recently discovered by Mr. H. N. Ridley.
2. *Sub-order Opisthothelæ.* Abdomen not segmented. Six, or fewer, spinning mammillæ placed near the hinder extremity of the lower surface of the abdomen. This Sub-order contains a host of forms, divided into two sections of many families; only a few of the more noticeable can be mentioned in the limits of this paper.

Section *Mygalomorphæ.*

Family *Theraphosidæ.*

These are the very large hairy spiders commonly called by the English in the Straits Settlements "Tarantulas", and called by the Siamese "Boum," what the effect of their bite on a man would be I cannot say; it is commonly supposed that the consequences would be very serious, if not fatal.

1. *Coremiocnemis cunicularius*, Simon.

These large dark brown and very hairy spiders are numerous on Penang Hill; most of my specimens were obtained near "the Crag" at an elevation of about 2200 feet. They make burrows, sometimes a couple of feet deep, in the steep banks at the side of the hill paths; the round entrance hole of these burrows is easily seen, and then the spider, if at home, may be carefully dug out. The Kling coolies I employed to help me digging were extremely afraid of these spiders, which they called (in Malay) "*Laba-laba gigi sakit*" (= the spider with the poisonous teeth). These spiders are fierce, very strong and difficult to kill without damaging them; I have found a specimen after three or four hours immersion in spirits of wine still to be so lively that it had to be handled with caution. The length of the caphalothorax and abdomen of one I measured was 46 mm. (1.8 inches), its hind-leg measuring 68 mm. (2.7 inches).

2. *Melopœus albostriatus*, Simon.

This species occurs in Siam; I was given a specimen said to have been caught at Ayuthia, but never came across it alive myself.

Family *Barychelidæ.*

3. *Encyocrypta sp. incert.*

I got this spider near the foot of Gunong Pulai, Johore, in September, 1897, but did not observe whether it had a "trapdoor" home or not.

Section *Arachnomorphæ.*

Family *Pholcidæ.*

4. *Artema atlanta*, Walck.

This elegant spider, better known as *Pholcus borbonicus*, with exceedingly long and slender legs is common in disused buildings in Bangkok. It is pale reddish brown in colour, except the abdomen which is grey. They apparently make no webs ; they can run very fast, but, as long as these is no crevice to dart away into, are easily caught in the hand. They may be from the tip of one extended fore-leg to the other as much as 140 mm. (or 5½ inches) ; though the length of the cephalothorax and abdomen is only 10 mm. (or .4 of an inch).

Family *Argiopidæ.*

5. *Argiope æmula*, Walck.

This species, which is widely distributed throughout the Criental regien, I obtained in Bangkok.

6. *Araneus de haanii*, Dol.

Collected in a house in Bangkok in July 1898.

7. *Herennia multipuncta*, Dol.

Obtained on Penang Hill in March 1896.

8. *Nephila maculata*, Fabr.

This is the most striking in appearance of the Malay spiders I have come across, and is by no means rare. It lives on trees both in gardens and in the jungle, but occasionally wanders into buildings, as I got a specimen in the Officer's Mess at Tanglin in April 1896. Its large web, constructed of beautiful yellow silk, is usually spread between two trees, and the great black and yellow spider sitting motionless, with legs spread out in the middle of it, in bright sunshine makes a fine picture. If taken in the hand, the collector will find this spider can bite hard with its powerful nippers. Besides Singapore I have noted this species in Taiping, Perak, in Bangkok and at Muok Lek in the Dong Phya Phai, Siam : it also occurs in Borneo, Celebes, Halmahera, Ternate, Batchian, New Britain, Solomon Islands, etc.

A Bangkok specimen was coloured as follows :—

cephalothorax, shining intense black.
abdomen, various shades of brown, with black marks and two conspicuous yellow spots.
limbs, red brown, black at the joints.

This species attains a great size; in an individual I measured the length of the cephalothorax and abdomen was 36 mm. (1.4 inches).

9. *Nephila malabarensis*, Walck.

This prettily marked spider is very common, especially about houses, making large webs under the eaves of roofs, in verandahs, etc; when houses are not at hand it seems equally content with rocks. I have noticed this species in Penang (especially near "the Crag"), in Singapore, in Alor Star, Kedah, in Bangkok and in Chantaboon: it also occurs in Java, Halmahera and other places in the East Indies. Quite small spiders will nearly always be found living in the webs of this species. I have not been able to make out so far if they belong to a different species, or if they are the males of the big females which construct the webs.

Colour (in life.) Upper surface of cephalothorax dark brown or dark red; upper surface of abdomen mottled olive brown, or whitey buff with brown marks. The specimens with the brown cephalothorax usually have red or rich orange markings underneath the cephalothorax and abdomen, those with red above have bright yellow markings underneath. The legs are pale yellow, black about the joints, and the last segment in each leg is brown.

10. *Gasteracantha sp. incert.*

This curious looking spider, with hard transversely dilated six-spined abdomen, is not uncommon in the jungle on Penang Hill. I have found it at elevation of from 2000 to 2400 feet during March 1898. It makes a very large, strong, geometrically arranged web of white silk between the stems or branches of trees; this web it keeps very tidy. One web, which I particularly noted, was situated between branches of trees over 15 feet apart, and was about 9 feet from the ground. The transverse width of its abdomen from point to point may exceed one inch (one fine specimen measured 28½ mm.)

Family *Psechridæ.*

11. *Psechrus singaporensis*, Thor.

In the Batu Caves, Selangor, in June 1898, in caverns remote from daylight, Mr. A. L. Butler and myself found certain spiders numerous, which make strong, untidy webs in crevices of the rocks. Specimens of the spiders were sent to Mr. Pocock who considers they probably belong to this species.

Family *Ctenidæ.*

12. *Ctenus fungifer*, Thor.

Known from Penang, (F.O.P. Cambridge, A. + M. N. H. [vi] xx, 1897, p. 334).

13. *Ctenus floweri*, Cambridge (loc. cit. supra. p. 348).

The types of this species I got on Penang Hill in March 1896.

Family *Heteropodidæ.*

14. *Heteropoda venatorea* (L.) The Hunting Spider.

Nearly every resident in the East Indies must know this fine spider which runs about houses, in the evening, catching its insect prey; it makes no web, but the female spins a whitish silk cocoon in which she carries about her eggs, which she looks after with great care and vigorously defends from enemies. What the effect of the bite of this spider on a human being would be I do not know, but it is certainly not prone to bite and I have never heard of its doing so, while as it is known to be very useful to mankind in destroying superabundant insects, it certainly ought to be encouraged and native servants should not be allowed to carelessly or wantonly kill them. It feeds on moths, crickets, etc., especially the big red cockroaches, which are such a nuisance in some places in the Straits Settlements. In a house individual spiders will often take up particular beats, which they occupy regularly night after night; in Bangkok one lived for many months behind my dressing table. Every evening when I placed a lamp on the table the spider came out from its retreat and took up his position by the light; at first we rather mistrusted each other—I being afraid the spider might some day bite me, and he carefully avoiding my coming too close to him, but as the weeks went by such mutual confidence sprung up that even when I touched him the spider would hardly shift his position.

I have noted this species in Singapore, Johore, Georgetown (Penang), Kedah, Bangkok, Ayuthia, Tahkamen, Chantaboon and also on board local coasting steamers.

It is also recorded from Java, Borneo, Celebes, Halmahera, Ternate, Batchian, New Britain, Solomon Islands, tropical Africa, etc., etc.

A specimen I kept for a time in captivity in a large glass jar together with a small scorpion *Archisometrus mucronatus*, and a *Thelyphonus* did not interfere with them in any way or they with it. Whenever the spider rested on the glass sides of the vessel it put its spinnarets in rapid motion and formed a small anchor of white silk and then let down one fine silk thread as if to help support itself: in a few days it had to some extent obscured the whole surface of the glass by the number of these anchors it had made and abandoned.

15. *Heteropoda thoracica* (C. Koch).

I caught specimens of this very handsome spider in the inner, deepest caves, far from daylight, over an hour's walk from the entrance in the hill side, Gunong Gajah, Kedah, in June 1898. They ran with great agility over the rough walls of rock, and also when we tried to catch them sprang away from the rocks into the air; the Malays were very frightened of them. Although living in darkness the spiders did not seem at all confused by the light of the lamp and torches. On the two occassions I have collected in these caves, in April 1895 and June 1898, we only met these spiders in one part of the caves, the deepest part.

Colour, yellow ochre, marked with rich dark brown.

Size,	Cephalothorax,	length,	16	mm.
	,,	width	12.5	,,
	Abdomen,	length	17	,,
	,,	width	8	,,
	Palp,	length	27	,,
	1st leg,	,,	83	,,
	2nd ,,	,,	91	,,

3rd leg length 73 mm.
4th ,, ,, 82 ,,
Total span (across 2nd pair of legs from tip to tip)
194 mm. (= $7\frac{5}{8}$ inches).

This species has been recorded from Sumatra, Java, Amboina, etc.

16. *Thelcticopis modesta*, Thorell.

I obtained this species in Penang in 1896.

Order *Opiliones*.

The Harvest Spiders.

Animals superficially resembling the true Spiders; like them they have four pairs of legs, of similar construction, and two modified anterior pairs of limbs; one (the palpi) not pincer-like, but sometimes capable of folding back on themselves, sometimes armed with spines, and composed of six segments, including the basal segment or maxilla, except in the *Ricinulei* which have five segments; and one (the mandibles) pincer-like and composed of three segments, except in the *Ricinulei* which have but two.

The abdomen is segmented, composed of from 3 to 8 segments. In the true spiders the breathing apparatus consists sometimes of four pairs of lung-sacs, but generally the hinder pair are replaced by tracheal tubes; in the harvest spiders the breathing apparatus consists of tracheal tubes, opening by one pair of orifices situated on the sternal plate of the abdomen.

There are no spinning glands.

Family *Oncopodidæ*.

1. *Gnomulus rostratus*, Thorell. (Ann. Mus. Genov. xxx, p. 378. 1890); found in Penang.
2. *Oncopus feæ*, Thorell. (Ann. Mus. Genov. xxx, p. 375, [1890]); found in Penang.
3. *Oncopus truncatus*, Thorell. (Ann. Mus. Genov. xxx, p. 764, [1890]); found in Singapore.

"The British Museum has from time to time received a number of specimens from Mr. H. N. Ridley" (A. + M. N. H.

Ser. 6, xix, p. 288). I obtained one individual of this species in the jungle at the foot of Gunong Pulai, Johore, in September, 1897.

4. *Oncopus alticeps*, Pocock (A. + M. N. H. Ser. 6, vol. xix, 1897, p. 287).

The type specimen I found on Penang Hill, about 2200 feet elevation; 29th November, 1896.

Family *Phalangidæ.*

5. *Gagrella sp. incert.*

I obtained specimens of these very long legged beasts in Bangkok and at Bortong Kabin; at the latter place in March 1897 there were countless thousands of them collected in certain spots, a wonderful sight.

Notes of a Tour through the Siamese States on the West Coast of the Malay Peninsula, 1900.

By C. W. S. Kynnersley.

Having assumed charge of the Consulate in April this year and wishing to become acquainted with some of the Western Siamese States which have not been visited since 1894, I left Penang in the colonial launch *Seabird* at 10 P. M. on

Tuesday 11th December, taking with me Mr. PEEL, District Officer, Bukit Mertajam. I elected to go in December as the weather at this season is settled with a N. E. wind blowing from the land. It was a fine moonlight night and we reached the mouth of the Kedah river before daybreak.

Wednesday 12th December.—The Sultan's Secretary came on board at the entrance to the river and we reached the landing place at *Alorstar* about 6.0 A. M. Here I was received by some of the leading officials and a guard of honour and we drove in a carriage and pair to the Sultan's country house at *Anak bukit.* H. H. the RAJA MUDA accompanied us. I arranged to be at the Consulate at 9.0, previous notice having been given of my intended visit some time before. After breakfast we drove to the Consulate which has been lately repaired. Every assistance was given to me by the Kedah Officials. I enquired into several cases of minor importance and a considerable number of British subjects presented themselves for registration. Having despatched the business in hand and arranged to attend the next day, we drove back to *Anak bukit* where I discussed various questions with the RAJA MUDA. At 3.0 P.M. I paid an official visit to H. H. the Sultan who is in very feeble health and at times hardly equal to transact public business. Having taken leave of the Sultan we proceeded with the RAJA MUDA to inspect the Public Offices. The buildings are excellently adapted for the purpose and present quite an imposing appearance, though the style of architecture may not be of the highest order. They were completed about four years ago and reflect great credit on the designer who carried out the work—MAHOMED LEBBY TAMBI, formerly employed under me in the Police Court, Penang. He is now building a fine new house for the RAJA MUDA.

The offices are admirably arranged—Treasury, Land and Survey, Courts of Law, and lastly an office for the Auditor-General. The various officials, including the Judge, were introduced. We were shewn a survey map of the town with all the various lots marked on it. The offices are open from 10.0 to 4.0, Malays being exclusively employed, and in outward appearance at all events our colonial system is followed. So far as we could ascertain the office of Auditor-General is somewhat of a sinecure. He is said to query and examine accounts but there were no papers or books in his office. A census has lately been taken and we were shewn the figures which, however, are still incomplete for some of the up-country *Mukims*. I have on former occasions inspected the gaol, but did not do so on this visit. I noticed that the outside wall was beautifully white but the interior arrangements are I fancy what they have always been and are hardly up to date. Prisoners in chains are employed on outside labour in the town. A Kling *dobi* prisoner sent me a petition complaining that he was kept in gaol beyond the term of his sentence, but his warrant of commitment, which was produced, proved that his statement was incorrect. The RAJA MUDA, his younger brother, a son of TUNGKU DIA UDIN, the Auditor-General and two others dined at *Anak bukit.* We were the guests of the RAJA MUDA.

Thursday 13th December.—The RAJA MUDA came at 7.30 A. M. and we went down the river to the Consulate in a house boat, the RAJA MUDA pointing out the place where Lieut. THURBURM, R. N., of H. M. S. *Hyacinth*, was drowned when crossing the river at night after snipe shooting in October, 1891. The current here is strong and the boat must have struck a snag and capsized. The body was recovered opposite the Consulate 1½ miles down the river. The grave in the consular grounds, which has a stone cross over it, is kept in good order. Enquired into a number of cases including a complaint by a Penang Chinaman as to the decision of the Kedah Government with regard to a grant of land at Kulim. TUAN BULAT, Collector of Land Revenue, produced the plans and the documents and after a full explanation of the case I came to the conclusion that the Kedah authorities were justified in their action. A certificate had been granted to a Malay man in Penang who claimed to have been born in Province Wellesley, alleging that his father moved to Kedah when he was 6 years old. Good evidence being produced that he was born in Kedah territory I cancelled the certificate. A large number of British subjects were registered. The consular business being concluded we drove back to *Anak bukit.* At 4.0 we went by invitation to tea at the RAJA MUDA'S and found a garden party assembled, all the leading officials having been invited. Having partaken of coffee, ices, etc., in the garden we adjourned to the billiard room. Returning to *Anak bukit* for dinner we left at 10.0, going on board the *Seabird.* The RAJA MUDA and others saw us off and we dropped down stream slowly, anchoring about midnight inside the bar. I have visited Kedah at intervals since 1873 when I spent some weeks there learning Malay and I have always met with the utmost hospitality and kindness on the part of the reigning family and officials.

Friday, 14th December.—Having crossed the bar at high tide about 4.0 A.M. we had a calm voyage with a light cool breeze from the shore. We passed numerous limestone islets and rocks of quaint shapes. At times it came on to blow fresh from the N. E. and the spray from the white waves broke over our bows. Passing Cone Island near which the S. S. *Perse* recently struck an uncharted rock and went down, "Cut Islands" and the twin rocks called in the chart "Darby and Joan" we made for the entrance of the Trang River which for half an hour was hidden from us by a heavy rain squall which came on from the N. E. The Trang River is like the majority of those along this coast, broad and fringed with mangroves, with many channels. Having taken a pilot from Penang we were successful in reaching our destination without grounding on the mud banks. The seat of Government is by no means imposing. There is no town. At the landing place we were met by Mr. KHAW JU KEAT—the Governor's nephew—two pony-traps being sent down to convey us to the Governor's house which is situated about a quarter of a mile from the jetty. There is a Custom House and a few Chinese shops. We were not expected so early. Mr. KHAW SIM BEE, whose Siamese title is Phya Rasdanupradit, etc., the Governor, received us most cordially and after giving us tea drove us along a new road which he has made round a wooded hill on which his house stands. On the way he pointed out the new Government Offices consisting of Treasury, Court and Land Office which have been commenced opposite the gaol. The prisoners, Chinese and Siamese, are employed in making bricks and on road work. Mr. KHAW SIM BEE belongs to a wealthy Penang family and is an admirable administrator. Being intimately connected with Penang he can do much in the way of extending the trade of that Settlement with Trang and the neighbouring Siamese States. He owns a Steamer which runs regularly between Trang, Pung-a, Penang and Deli.

The old town and mines, where some hundreds of Cantonese and Khehs are employed, are situated some miles up the river and the tin is brought down to the river on elephants four miles by a bad road. We had not time to visit them. Mr. KHAW SIM BEE described how he had effectually suppressed the Secret Societies some years ago, since when there have been no signs of their revival. He also informed me that the Siamese Government had decided to abolish the Gambling Farms and this was gradually being done. There is only one Sikh in the place, who is employed as a detective to see that no Government employée attends the Gambling Farm.

Pepper thrives well in Trang, 25,000 pikuls being produced in a year valued at $28 a pikul. The soil is said to be excellent. Mr. KHAW SIM BEE pointed out a new elephant-road to Nakon on the East coast 70 miles distant. It is dignified by the name of a road but at present hardly deserves the title. About 15 years ago orders were given from Bangkok to connect these Western States by telegraph. Poles were prepared for the connection between Trang and Ghirbi and the wire has been lying at Trang ever since. Many reforms are being introduced by the Siamese Government in these States. The officials of the old school have been removed and are replaced by young men from Bangkok who have had some training in their duties. The latest innovation is the introduction of the Burma village system of headmen under which police and paid officials are dispensed with up country. Ten houses elect a headman. A group of ten villages has a representative headman. All occurrences such as births, deaths, fires, disturbances, crimes, etc., are reported and no one can move from one village to another without the fact being reported and some one found responsible for him. Mr. KHAW SIM BEE says that since the introduction of this system crime has practically disappeared. The Siamese he says as a rule are well behaved but when they are bad they are desperately bad. The Treasury accounts are kept in the English fashion. The law is framed on European models and everything is up to date. The Opium Farm is run on the same lines as in Penang, the retail prices being the same. Living is apparently very cheap and prices are very much lower than in the Colony. Fowls are 25 cents, buffaloes $30 to $35. A certain amount of timber is exported besides tin and pepper. Giam (used for boat building and other purposes) is exported to Penang and Calcutta. Peacocks and teal are plentiful within easy reach of the Governor's place, also green pigeon, and *pergam*. The revenue is paid as in the other Western States through the Siamese Consul-General in Penang, 60% going to Bangkok. This is a considerable drain on the resources of the States and may help to explain why so many useful public works, which are projected, are not carried out.

There are few British subjects in the place and their interests may safely be entrusted to Mr. KHAW SIM BEE who is himself a British subject.

The Governors of Tongkah and Ghirbi, who were leaving for Bangkok to take part in cremation ceremonies, dined with Mr. KHAW SIM BEE that night as well as two other officials. The Governor of Ghirbi speaks English. I explained to him that I had intended to visit Ghirbi on my return journey but would postpone my visit as he would be absent. Ghibri produces an inferior quality of coal or rather lignite of no commercial value though it is used with other fuel by small steamers.

Mr. KHAW SIM BEE entertained us most hospitably and we slept at his house that night.

Saturday, 15th December.—Mr. KHAW SIM BEE when in Penang had kindly placed at my disposal the small steamer *Damrong Rat*, so I left orders for the *Seabird* to meet us off Telibon Island on our return from Tongkah. Mr. KHAW SIM BEE also very kindly sent his nephew Mr. KHAW JU KEAT, who speaks English and Siamese, with us and he proved of the greatest assistance. A Marine Police Guard (Siamese) was drawn up at the jetty when we drove down and we took leave of the governor about 7.0 A. M., the *Damrong Rat* flying the consular flag. Outside the mouth of the Trang River we found the S. S. *Artsadong*, the small steamer that runs between Penang and Pung-a owned by Mr. KHAW SIM BEE, high and dry on a sand bank. She had left Trang for Pung-a at night and not being able to make out the narrow channel marked by stakes had got on the bank about 2.0 A. M. on the 14th. After passing round Telibon Island the sea got rougher with a strong breeze from the land. The long island of Pulau Lontar sheltered us part of the way. After passing Pulau Lontar the sea got rougher as we got further from the land. Then after rounding a small island we altered our course for Tongkah with a following sea. The anchorage at Puket resembles that of Malacca during the S. W. monsoon. The harbour is very shallow and is exposed to the N. E. The Siamese gunboat *Ran Ruk* and S. S. *Petrel* were lying a mile or so from the shore. Captain RING of the *Ran Ruk* kindly sent a boat off at once, and owing to the heavy sea running we had some difficulty in getting off. However we got ashore in safety about 6.0 P.M. Captain RING met us at the jetty, took us to his house, which is near, and introduced us to his wife, the daughter of Captain WEBER of Tongkah. The Chief Commissioner of the Western Siamese States had sent his carriage for us and we were met by the Acting Superintendent of Police (Siamese) who talks English well, having been formerly employed in the Penang Land Office. We were received by the Chief Commissioner who introduced us to his wife in a large reception room furnished in European style. He hospitably placed rooms at our disposal and asked us to make ourselves at home. His Excellency did not understand English but with the help of the Superintendent of Police and Mr. JU KEAT we got on very well during dinner. His wife knew a few words of English learnt in Penang where their son is being educated at the Brothers' School. The Commissioner is a person of great importance being over the local governors and corresponding with Bangkok frequently.

Sunday, 16th December.—We had arranged to go early with Mr. ROSS CLUNIES, Superintendent of Mines, to see a new road, but we found carriages ready and the Commissioner prepared to show us round himself. We were driven about a mile along a grass covered road till we were brought to a stop by an unbridged stream. This afforded a good example of what we found very common in these Siamese places. Roads, bridges, and improvements generally are talked of but not made. Everything bad is attributed to the late Governor. All sorts of wonderful schemes are going to be carried out by the present man. The old Governor for instance allowed Chinese to bury where they liked. The hills were allowed to be cleared of jungle for hill padi. Anyone could dig for tin anywhere, etc. The old Governor is said to be responsible for the tumble down building which serves as the Post Office and so on.

The explanation for allowing this stream to be unbridged was that all the timber obtained from Penang and Singapore which was lying ready was burnt one night owing to a lamp falling. We were told there was no stone available though I saw plenty within a quarter of a mile. We passed the house of the Superintendent of Police, Mr. HARTNELL, lent from the Burma Police, who is at present on leave in England. Mr. CLUNIES was also to have a house there and we climbed a small hill chosen as the site for a house for the King of Siam. It is nice open grass country interspersed with scrub. The plans are said to be all ready but it is very doubtful if the house will be built or the road ever completed as there is a newer scheme for moving the town about two miles further away to the bay near the Light-house island which is sheltered and is said to have deep water. If this scheme is ever carried out the site of the present town will be given up to mining as it is known to be rich in tin. We then drove to the Central Police Station which was prepared for me to hold a Consular Court and I arranged to be there at 11.30. From there we drove to the mines. These are interesting from the fact that they are in the former bed of the sea, an embankment being carried a quarter of a mile or so out to sea so as to enclose the mine. Two or three thousand Chinese miners, all Hokkiens, are employed here and there must be quite as many pigs as Chinese. These pigs are exported to Penang. Within the embankment which keeps the sea out the sand and clay have been excavated to a depth of some 50 or 60 feet below sea level. It is an enormous work which may or may not be rewarded by success. I was told that there was a loss of $50,000 during the present year but this may not be true. We saw some tin sand being washed in the usual way. At present the average yield is 12 pikuls a day but it is hoped soon to reach a richer stratum. The particles of tin are very small whereas in the mines near the hills large *biji* are said to be found. After inspecting the mines we drove to the Government Offices and were introduced to the Treasurer and a youthful looking Chief Justice aged between 30 and 35. I wanted to post a letter but we were not taken to see the Post Office, which being a relic of the old Governor's régime is not one of the show places. The Chief Commissioner has a good Office. Here we saw several typewriters in Siamese character at work. On the walls were some recent Siamese maps. During the day we received typewritten formal invitations to dine with our host. After breakfast at 10.0 we drove to the Central Police Station where I was presented with two petitions from Klings. One was about the division of some property of a deceased Kling man. It appeared that he traded in cattle and several persons were indebted to him. Before his death he called his friends and told them to bury him decently and have a feast, collect what was due to him and keep the money for his widow in India. They appear to have carried out part of the trust and the recollection of the goats and fowls slaughtered in honour of deceased was still in their minds. So far as I could ascertain there remained a sum of about $2.50 for the relatives, deposited with a Siamese official. The other petition related to a matter which is still *sub judice.* Two Kling British subjects had a difference about some accounts and one was alleged to have assaulted the other. The case came before the judge and one was mulcted in damages and ordered to pay $30 or some such amount. Against this decision he had appealed to the Council-General at Bangkok and an answer was expected in a few weeks. Klings cannot exist without litigation and I should think that the Siamese judicial system is well calculated to satisfy them. It must be a great luxury to be able to appeal to Bangkok in any trivial matter even if there are no results. While waiting I noticed a Sikh orderly being measured against the wall for his descriptive roll as a British subject. He was wearing a specially high turban and I asked what his height for the Register was. I was told 5 feet 8 inches, but having removed his turban and boots he only reached 5 feet 4 inches. A large number of Sikhs were formerly employed at Tongkah but they were found troublesome and have been replaced by Siamese, only a few orderlies being retained. When the consular business was finished we inspected the Club where we saw some new Penang papers brought by the *Petrel*. We then paid a surreptitious visit to the office of "the Royal Siamese Posts and Telegraphs." I asked for stamps but was informed that they were not kept and letters must be forwarded on board. We did not ask to telegraph anywhere as we had been told that the telegraph posts and wires which run along the new road lead nowhere. In the afternoon Mr. CLUNIES came and fetched us with a buggy and dogcart. He drove me while Mr. PEEL followed in his pony cart. We drove through the principal streets of the town. We passed over one new plank bridge but all the rest were rotten and there were great pits in the road. Bridges are said to be repaired only on the occasion of a wedding. We drove some distance along the projected new road to the town of the future on raised turfy land through brushwood. Everywhere were excavations for tin. Chinese graves, some newly dug—in spite of the new régime—were also plentiful in the brushwood. We then walked half a mile till we came to a mangrove swamp —then back along a cart track with the deepest ruts I ever saw till we struck the main road to the up-country mines. This road might easily be put in good order but nothing is done to it and there are deep holes in it. Up the valley is a wonderful aqueduct built of scaffold poles by Chinese some years ago which is said to be seven miles long and 100 feet high. We were shewn a photograph of this and I should have liked to have seen it. Having driven through the town we called on Captain RING and found a gale blowing. The weather looked very bad and it was suggested that we had better delay our departure till next morning. There was a dinner party in our honour that night. Captain RING and two Danish officers of the *Ran Ruk*, the Chief Justice, Treasurer, Mr. CLUNIES and others, about 14 in all. A Siamese band played during dinner, Siamese and Chinese tunes, flutes and fiddles. I took the Commissioner's wife down and she was the only lady. The Commissioner after "the King" proposed our health and I replied. We left about 9.30 and went on board the *Damrong Rat* in Captain RING'S boat. Happily the wind had gone down. It was pretty rough outside with a head wind and the boat pitched and rolled, the sea coming over the bows. We got into smooth water under Pulau Panjang about 3.0 or 4.0 A. M. and anchored in the Pung-a River.

Monday, 17th December.—A lovely cool morning and the view beautiful beyond description with numberless limestone islets and rocks some rising to the height of four or five hundred feet with precipitous sides clothed with verdure. Mr. JU KEAT had started at 5.30 up the river to convey a letter from the Commissioner to the Governor. We were told that he could not be back for an hour or so and we therefore went in a boat— a very leaky one—to explore the river, taking the camera and Mr. CURTIS'S orchid and plant collector. The Pung-a River forms part of a network of broad channels among mangroves out of which rise at intervals great isolated limestone crags and precipitous rocks, some rising to 800 or 1,000 feet in height. Our men climbing up the steep rocks got a miscellaneous collection of plants and orchids which half filled our small boat. We also took several photographs of picturesque rocks and caves. Then we returned to breakfast on the launch. Mr. JU KEAT having returned we went in a boat about two miles up the river, taking a rifle in case there were any crocodiles on the mud banks. We did not see one though the tide was low. The stream or rather mangrove creek got very narrow and at length we reached the landing stage where a Police guard was drawn up, and we were met by the Governor's Secretary with a pony carriage. The Secretary did not speak English but we learnt through Mr. JU KEAT that this was a new road to take the place of the former Governor's road, which (of course) was bad. Like all the other roads we saw except that at Trang it was in an unfinished state completely grassed over with big holes in it, but further on it was much better. The scenery was very pretty. The road runs through an avenue of ansenas which at this season up north shed all their leaves. The road being covered with dead leaves reminded one of an English lane in autumn. There was nothing tropical about it but an occasional palm in the distance. On either side were broad stretches of fine turf with clumps of brushwood. Through the valley which is about two miles wide meanders the Pung-a River in a sandy bed. The valley is entirely hemmed in by precipitous limestone cliffs some 1,500 feet high. On the left going to Pung-a is a huge block shaped like an elephant. After passing several houses and the gaol enclosed by a palisade, we reached the Governor's place. The Governor received us most warmly and offered us tea and cigarettes in his verandah. He is a most genial man but unfortunately he upset our gravity by his first remark which was translated to us by Mr. JU KEAT with a smile: "This is a poor house to receive you in. It was built by the late Governor. I have plans all ready for a new house". The cigarettes made in Siamese fashion were excellent and the Governor told me they were made of Pung-a tobacco. The soil he says is very rich and will grow anything—100 pikuls of tobacco a year are produced, value $5,000. I asked him to send some tobacco, cigarettes, etc., to the Agricultural Show. He is very anxious to make known the resources of his district and said he was preparing a report which he promised to send to me. He said there was great difficulty in procuring labour for planting. The Chinese all go to the mines. 5,000 pikuls of tin are got—brought in by elephants which only carry 4 or 5 slabs. He is very anxious to get some natives of India for planting. In one island he said there were 500 deer which he hunts with a pack of dogs. Peacocks he said were very plentiful. It is certainly a lovely place—very cool at this time of year and, I should say, extremely healthy. The lunch was so excellent that I asked if he had a French cook. He said his cook was a Chinaman whom he brought from Bangkok. The Governor has a daughter being educated in the Penang Convent. He had been to Perak where Mr. RODGER had been very good to him he said. Just as we finished lunch three elephants arrived and the Governor asked if we would ride round and see the town, Rest House, etc. I mounted the leading one with the Governor and Mr. PEEL and Mr. JU KEAT followed. My elephant was valued at $1,200. A good number are sold to Burma. We first went along the road, the Governor who knows a few words of English pointing out the present very unpretending Government Offices and saying "no good house—next year estimate." The elephants, as is their wont, left the road wherever a bridge appeared and made a detour. There is only one narrow street in the "town." I noticed a pillar box close to the Post and Telegraph Office. The people are half Siamese and half Chinese and a good many of the houses are dilapidated. After passing through the "town" we struck the river bed and went down some distance. It has a broad sandy bed. In the rainy season it becomes a swollen torrent which at times floods the town. Passing round by the Governor's house we went some distance above the road leading to the river and came to a hill on which a Rest House has been built—a lovely site commanding a view of the valley. The Rest House is commodious but unfurnished. The Governor said that even at that season there were frequent showers which keep the place cool. There was a shower while we were there. The high cliffs clad with jungle no doubt attract the clouds. We were quite sorry to leave and I expressed my regret that as there were no British subjects I could not repeat my visit as Consul. The Governor saw us off at the landing place and as we passed I noticed two men mending some of the worst holes on the road. We found the *Damrong Rat* had left her anchorage and gone to the mouth of the river to take in firewood. This entailed an extra two miles pull for the men. We lay that night off the Custom House and slept on the deck peacefully.

Tuesday, 18th December.—A pilot came off early and we left at 6.0 to visit the Kesum cave. This is some miles up a river similar to the Pung-a River with limestone rocks rising out of the mangrove. Following one branch the river narrows and passes through a great limestone rock—forming a natural arch fringed with stalactites. It was so beautiful with the sun shining on the water seen through the arch that we took several photographs. Having passed under the rock and admired the scene we returned to the mouth of the river leaving for Trang about 9.0 A.M. It was blowing fresh and the sea was pretty rough—a glorious morning with a cool breeze from the land. Passing numberless limestone rocky islands we got under the lee of Pulau Lontar and before dark sighted Telibon Island. Off the Custom House we found the *Seabird* lying together with the *Artsadong* which had only just floated off the bank on which we found her when we first arrived at Trang. We slept on deck and had a cool peaceful night.

Wednesday, 19th December.—At daylight we started in a house boat to see some caves up a river which were said by Mr. KHAW SIM BEE to surpass those of Kedah. The caves are very disappointing and as we had no torches we could not explore them except by match light. It took us three hours to go and return and we regretted the delay as we could not reach the Langkawis before dark. Having taken leave of Mr. JU KEAT who had proved most invaluable to us we made for Pulu Terutau and anchored about 5.0 P. M. under the shelter of a small rocky island separated from the shore, where there were a few native huts, by a narrow channel. We were glad to get into smooth water for the night. We landed and searched for orchids till it got dark but the rock proved barren and unclimbable. Noticing after dinner that we were dragging our anchor and drifting into rough water I got the Captain to let out two fathoms more of cable.

Thursday, 20th December.—Made an early start for Kuah where we had arranged to meet His Highness the RAJA MUDA. It was still blowing fresh from the land. We reached Kuah about 9.0 and found the RAJA MUDA who had expected us the night before had gone on to Dayang Bunting so we followed. His small steamer was at anchor. He came on board and we went through an inland sea of wooded islands till we came to a small bay where we anchored and went ashore in boats to a long temporary jetty put up years ago for the King of Siam. We then followed a good jungle path through a plantation of durian and other fruit trees planted by the late WAN MAT. Having mounted to the top of a low ridge we descended to the shore of the lake Dayang Bunting where a long Malay house has been built on piles on the edge of the lake. Here elaborate preparations were made for a feast, tables, chairs and everything being brought by the numerous Malays who accompanied us. Mr. PEEL ventured on the lake in a small canoe. We then sent a man out to take soundings with the *Seabird's* lead. In the two places selected it was found to be 9 fathoms deep.

The lake is surrounded by jungle-clad limestone cliffs some 500 to 1,000 feet high which enclose the lake except at the lower end where a low rocky ridge separates it from the sea. The lake (fresh water) is about 500 yards long. We took a sample of the water which I brought to Penang for analysis. After an excellent meal we went round by boat to what once must have formed the inlet to the present lake from the sea. Masses of limestone rock have blocked the entrance so that there is now no connection between lake and sea. After climbing some rocks about 40 feet high we looked right down on the lake the surface of which, so far as we could judge, appeared to be some 10 feet above the sea level. This is a mere conjecture. From Dayang Bunting we should have gone to *Telaga tujoh* but the RAJA MUDA wanted to show us the Goa Cherita (Legend Cave) which they said could be reached in an hour. As a matter of fact it took us 2½ hours to get there. The scenery of this Archipelago is lovely as you wind about among the wooded hills. The highest hill is Gunong Raya which is over 3,000 feet high. A striking feature in the distance is the serrated range known as Gunong Chinchang. Once more we were destined to be disappointed in the matter of caves. The cave is a very ordinary limestone cave and the only interest that attaches to it is an inscription in Arabic character high on the limestone cliff at the entrance. Certain Arabic words and names can be made out but whether it is ancient as the Malays like to believe or only some hundred years old it is impossible to say. Below Malays and English visitors have inscribed their initials with charcoal and we were told to do the same. It was nearly dark when we started to return to Kuah. Fortunately we had a pilot who was able to direct our course through the winding channels sometimes very narrow and between high rocks. It was intricate navigation in the dark but we got safely back to Kuah about 8.0. We then landed and had dinner in a house built by WAN MAT after which we left with a Kedah pilot kindly lent by the RAJA MUDA.

Friday, 21st December.—Reached Penang about 7.0 A. M.

General Remarks.

The best season to visit these States is undoubtedly December-January when delightful weather may be counted on. It is the dry season and a cool breeze blows continuously off the land. The *Seabird* is not fit for such a trip. The *Damrang Rat* though not much bigger is a better sea boat. When I describe the sea as " rough " I mean for a launch. In the *Sea Belle* the trip at this time of year would be a delightful one, Pung-a especially being worth a visit for its lovely scenery.

One thing that struck us was that during all the while we were at sea—always in sight of land—we hardly saw a junk, boat or sign of population. In Trang and to the Northward the Malays or Samsams resemble the Siamese. They do not speak Malay but are said to be Mohamedans. Mr. MAXWELL'S remark in 1889 that the Siamese Government neither makes nor maintains roads is true now. Neither has the telegraph made any progress since that time. Mr. MAXWELL remarks further that these States all suffer from being regarded in Bangkok not as provinces to be developed but as mere sources of revenue to be spent at the capital. Sixty per cent. of the revenue still goes to Bangkok. There is evidently now a desire on the part of the Government at Bangkok to improve the local administration of these Western provinces and no doubt many reforms have been carried out in the last few years. At Trang there were many signs of progress visible. This I attribute to Mr. KHAW SIM BEE'S energy and good administration.

Tongkah is a land of promise. A large number of schemes are going to be carried out but these promises evoke a smile from those who have been used to the administration of the palace. The country is evidently full of tin but the Government does nothing to improve the roads or open up the place. The harbour has silted up and a vessel of any size has to anchor a long way out. I cannot say whether the new harbour will be adopted and the town moved as is talked of.

Puket, by the way, is the name ot the town, *Tongkah* being the name of the island or what is really a peninsula as the narrow strait (Pa Prak) is only half a mile across and fordable by elephants at low tide.

The Strait is between *Salang* and *Takuatong* on the mainland hence the Malay name for Tongkah *Ujong Salang* corrupted to Junk Ceylon. No one can visit these places without seeing how dependent they are on Penang. Under a Government such as that of the Federated Malay States they could soon be changed into rich provinces and trade would expand in a wonderful manner. With mineral wealth and a fertile soil the population would increase and Chinese would be attracted to invest capital there. Under the present régime in spite of many reforms in the selection of officers, the administration of justice, etc., it may be doubted whether any substantial progress will be made toward opening up the country, at all events unless the revenue is spent on public works and improvements. Formerly when the mines were more prosperous 60 Sikhs were employed under Captain WEBER but these have been dispensed with and the only British subjects beyond a few Penang-born Chinese appear to be Klings who trade in cattle with Penang. Capital punishment is not inflicted in these States—those convicted of capital offences being sent to Bangkok.

From the islands in this archipelago which are scarcely inhabited are procured edible birds' nests and guano.

Captain RING of the Royal Siamese Navy showed us a collection of small clay figures of Buddha said to have been found by the collectors of guano buried in caves. Whether these are ancient as supposed or modern I am unable to say. Mr. KHAW JU KEAT promised to send me some which I will forward to the Curator of the Raffles Museum.

The long wooded island of Pulau Lontar (said to be coveted by the Germans) lying to the North Trang fringed on the west by a sandy shore appears to be scarcely inhabited except by a few fishermen. The Langkawi group of islands are sparsely inhabited by Malays and there are said to be about 100 Chinese. Achinese are planting pepper in one place. Pulau Adang, one of the Butong group lying to the North of the Langkawis and further out to sea, is visible on a clear day from Penang Hill. This lies near the track of the British India boats on the way to Rangoon and would be worth a visit.

I enquired into the health of the place we touched at. In Kedah there is a Eurasian doctor (BOYER) who told me that there was little sickness. The drinking water is derived from the Kedah river which passes the Consulate and *Anak bukit.* The water is somewhat brackish and must be much polluted. Trang was said to be very healthy. In the early part of the year a few cases of plague occurred among the miners in Tongkah but this appears to have died out soon and the health of the place is now said to be good. The Siamese Government on the representation of our Government decided to appoint a Medical Officer to reside there. No one has yet been appointed and the Commissioner consulted me as to whether a Dr. AMNER who has been residing there for some time was fitted for the place. I could only say that I believed he had the necessary qualifications but could not be sure. The Governor of Pung-a assured me that his place was extremely healthy and that there was no sickness.

I had not visited Kedah, with which I was formerly well acquainted, for many years. It is a fine country—a vast tract of padi land interspersed with low hills. The revenue has increased very considerably of late. The Sultan spends the revenue as he likes, sending the "Bunga mas" to the King of Siam as Suzerain. A Penang Chinaman advances money to the Malay cultivators and mills the rice purchased from them. Another Chinaman has opened up a sugar estate on the banks of the river below *Alor star.* The Sinkep Tin Mining Company are working with success near the base of Kedah Peak while there are large tapioca plantations near the Muda. Kulim at the back of Bukit Mertajam is a thriving place with Chinese tin mines and plantations. It would be an advantage if the railway were extended from Bukit Mertajam to Kulim as has long been proposed but the Sultan of Kedah is at present in such a feeble state of health that he hesitates to take any action in the matter though he says he will not object to the railway.

It is interesting to see how a purely Malay Government without European interference or guidance has endeavoured to model the administration on our colonial lines even to the appointment of an Auditor General. Only Malays are employed in the public offices most of them being men of good position. Here there is a real Post and Telegraph Office, the Telegraph Department being superintended by a son of the Government Munshi at Singapore.

I cannot conclude without referring to the hospitable and kind way in which we were everywhere received, the authorities doing everything that could be done to make our visit agreeable and assisting me in my consular work.

The Relations between Southern India and the Straits Settlements.

BY W. A. O'SULLIVAN.

A few years ago, a very able paper was read by Mr. C. O. Blagden before the Straits Philosophical Society, on the subject of "Arabian Influences in the Far East," and evoked a warm discussion. I thought with others at the time that Mr. Blagden claimed too great an influence for the Arabs, both as a converting and civilizing agency in the Far East. I have since so far modified that opinion, from wider reading, that I am now fully convinced that it was the Arab traders, or rather the Arab bandits whom they brought in their train, who effected the conversion to Islam of the vast majority of the people inhabiting the Malay Peninsula and the Indonesian Archipelago. To this belief I have been induced, not so much by the discovery of any additional historical data beyond what the essayist put forward, as by the living testimony afforded by language, a proof more to be relied on than a thousand traditions. Almost every word in Malay connected with religious worship is pure Arabic, only modified by the difficulty the converts experienced in pronouncing the language of their teachers. The same is the case with the Achinese, Sundanese, Javanese—in a word, with all the languages of the Archipelago whose speakers have embraced Islam; the Malays, it may be added, have also adopted the Arabic character.

It is not, then, to India that we have to look as having imparted to Malaya the present religion of its inhabitants, or such elements of its civilization as are bound up with their creed. But civilization and social development, much as they may owe to religion, are not coincident with it, and I think still that Mr. Blagden went too far in claiming for the Arabs the lion's share of influence on the social life of the Malays. Right throughout the Indian Archipelago (which I take for convenience sake to include this Peninsula) there co-exists with *hukum*, or religious law, a great unwritten code of native custom, known as *adat*. This not only flourishes side by side with the *hukum*, but often overrides it when the two come into conflict. Of this *adat*, part is immemorial usage, with its roots so deep in the past that they may not be uncovered. Part, however, is of more modern growth, and under this I should class all that these peoples have derived from foreign influence. We have no historical data full enough to enable us to separate these with accuracy; yet to presume that the present civilization of Malays, over and above what is included in their religion, was wholly indigenous and pristine, is to reject such data as we do possess, to scorn the testimony of language, and to assume that the Malayan races possessed an ancient civilization of their own, of which there is not a particle of evidence.

The Arabs came to the Far East purely as traders accompanied, no doubt, by a few pandits or religious teachers, to whose proselytizing agency was due the establishment of the Mohammedan religion in the Archipelago. Some few would seem to have settled down, but, beyond the teaching which found such ready listeners, they appear to have had little influence on native social life, and especially on the *adat*. Indeed as good Moslems, they would feel bound to uphold the *hukum* in opposition to the latter. Whence, then, did the Malays get the balance of their civilization, from the simpler arts which separate them from the rudest of savages to the code of native custom which, just as much as the Arab creed, gives them a right to be regarded as a civilized race? I unhesitatingly reply, from India, and probably, by virtue of its proximity, from Southern India.

There are abundant traces, both in Sumatra and Java, but especially in the latter, of the existence, long anterior to Mohammedanism, of a very complete Hindu civilization. How this came about, whether by conquest or pacific conversion, it is now impossible to say. Nor have we any historical records to show us what Hindu nation it was that exercised the first civilizing influence. In Java, indeed, a great Hindu empire continued right down to the year 1475 A. D., when the conversion to Mohammedanism took place, and numerous runied shrines testify how widespread was the earlier faith. But the conquering or proselytizing Hindu stranger has entirely disappeared, for although the kings of Manjapahit claimed to be descended from princes of Hindustan, the purely Javan appearance of their descendants somewhat belies this tradition. The visible traces of such a civilization in Sumatra and the Malay Peninsula are much more feeble than in Java; they are, indeed, confined to a few ruins and inscriptions on stones and rocks, the former of doubtful import and the latter practically undecipherable, though the character is either Sanskrit or Pali.

In the absence of such visible tokens, we turn again to that infallible guide, the language of the people. As I have said above, the influence of the Arabs on the Malay language is almost confined to religion and religious law, but does not otherwise enter into the social life of the people. Far otherwise is it with the influence of the Hindus. Marsden (Asiatic Researches, vol. iv, pp. 223-7) writes as follows :—" The language (i.e. Malay), it is true, abounds at present with Arabic words, which their writers affect to introduce, because this display of literary skill is at the same time a proof of their religious knowledge; but they are generally legal or metaphysical terms borrowed from the Koran or its commentaries, are never expressive of simple ideas, have not been incorporated into the language (a few excepted), and are rarely made use of in conversation. The Hindu words, on the contrary, are such as the progress of civilization must soon have rendered necessary, being frequently expressive of the feelings of the mind, or denoting those ordinary modes of thought which result from the social habits of mankind, or from the wills that tend to interrupt them."

Of a truth Malay abounds in Sanskrit words, the significance of which is ably traced in the preface to Maxwell's Malay Manual. To go no further, the fact that the common Malay words for " religion " (agama), " a plough " (tenggala), " time " (kali, masa), with many others of the same kind, are derived from Sanskrit, points to Hindu influence as having first raised the Malay from barbarism, taught him some of the very crudest arts of civilization, and supplied him with a religion. Now, the Sanskrit element in Malay can only have come from India, and it fully justifies us, taking also into consideration the existence of a complete Hindu civilization proved by historical data to have subsisted in Java, in concluding that there must have been in earlier ages a domination of intellect, if not of conquest, by some Hindu power of Hindustan over the whole of Malaya.

The defect of the language-test is that it does not aid us, except inferentially, in fixing the date of the commencement of this domination or in determining the length of its existence; but it may help us to decide from what part of Hindustan the civilizing influence proceeded. As to the former, all we know for certain is that the Hindu influence was antecedent to that of Islam; while as to the latter, in addition to the very slender evidence of history and tradition, and comparison with the relations of India with neighbouring countries, we can take as our guide the various Indian elements which have found their way into the Malayan tongue.

Sanskrit—that is, the pure Sanskrit of the Vedas—ceased to exist as a living language about 300 B.C. Various dialects, however, more or less debased from Sanskrit, but having a vocabulary largely identical with the parent tongue, continued to subsist as spoken languages. It is not inconceivable that the Hindu influence on Malaya may have begun when Sanskrit was yet a living language. As regards Java however, the Dutch scholars have fixed the introduction of Hinduism at the beginning of the 6th century A.D., and it would seem probable that its extension to Malaya took place about the same epoch or even later. Be this as it may, it is most unlikely that this early civilization of the Malays, which coloured their language so strongly with Sanskrit words, proceeded from any other than a genuine Aryan race, of Hindustan, speaking Sanskrit or a dialect closely akin to it. But within historic times the South of India has been inhabited by Tamulic or Dravidian races; and had their first civilization been imparted to the Malaya by Hindus of this stock, the Sanskrit words would have been filtered through a Dravidian medium, and appeared in Malay in a quite different form from that which they have actually assumed. It must be taken for granted, than, that this earliest influence proceeded from a genuine Hindu race inhabiting central or northern India, and perhaps commanding a part of its seaboard in the South by virtue of conquest or commerce, and who made this the starting-point for their pioneering work in the Far East.

I think we may entirely reject Crawfurds' theory that these first civilizers were Telegus. Had it been so, they must have left traces of their own vernacular on the Malayan speech, for it is inconceivable that the priests, as Crawfurd thinks, could have introduced into Malay elements of a dead language, used only for sacred purposes, as part of the common speech, while not a word of their own colloquial crept in to testity to the identity of the dominating race. For I think I am right in saying that there are few or no Telugu words in Malay, or, at all events, not one which might not equally well have come from Tamil.

None the less is it true a Dravidian race has had a very important influence on the language and social life of the Malays, and this in spite of Marsden's statement that "from the Telinga or the Tamool the Malayan has not received any portion of its improvement." This influence was probably brought to bear on Malaya a good deal later than the Sanskrit, and was, without doubt, the direct result of trade. Commercial intercourse was maintained from a very early date between the South of India and the trading towns which formed the emporia of the spice islands, notably Johor, Singapore, and Malacca. When the Portuguese, at the commencement of the 16th century, first visited these places, they were amazed at the concourse of foreign vessels assembled there. When this intercourse began it is impossible to say, but it was probably much earlier than the above. Snouck-Hurgronje, writing of Acheh, says that the settlement of Klings from Southern India in that country is of great antiquity; and that the Tamils were the leaders in this commercial enterprise in Malaya is clearly shown by the pure Tamil words—chiefly connected with commerce, though not altogether so—which have found their way into Malay.

These words are not numerous, but they are names of familiar objects, and we must remember that, as a test of the social influence of one race on another, the presence of one common word for some necessary thing is of more significance than a thousand technical or scientific terms, which are really only a part of the language of books, and do not enter into daily life. The Malay for "ship," *Kapal*, is pure Tamil, so are *Kedei*, "a shop," and *gedong*, "a storehouse." *Peti*, "a box," though it has a Sanskrit equivalent has also probably come through Tamil, for in Sanskrit it means "bag" or "basket," while in Tamil it has exactly the same meaning as in Malay. What can be clearer evidence of commercial intercourse—nay, of the Tamils having actually introduced the Malays to trade in bulk? They also imported and brought into use certain articles of commerce and animals with which the Malays were previously unacquainted, as is shown by the wards *cherutu*, "a cigar;" *badam*, "an almond;" *kalde*, "an ass;" the fruit *belimbing*; *beludu* "velvet;" *bedi*, "a gun" (from the Tamil word "vedi," an explosion or report). All the above are pure Tamil. The derivation of *kuda*, "a horse," from *kuthirai* is not certain; but the pure Tamil *padagu*, "boat," may reasonably be taken to be the parent of the Malay *prahu*. If this be so, it would seem as if the Tamils first introduced the Malays to even the most elementary navigation, and, as they also gave them *kapal*, taught them to "go down to the sea in ships." A large number of words derived from the Sanskrit are common to both Tamil and Malay, the greater number of which were acquired independently by the two languages. The following are examples:—Mal. *Kali*, Tam. *kalam*; Mal. *denda*, Tam. *thendam*; Mal. *bahaya*, Tam. *bayam*; Mal. *muka*, Tam. *mugam*, &c. In nearly all these the terminal "m" is characteristic of Tamil; and where we find words derived from the Sanskrit which have this termination in Malay as well as in Tamil, we may fairly conclude that they come through the latter language and not direct from Sanskrit: e. g. *kolam*, "a pond" Tam. *kulam*, Sans. *kola*; and *manigam*, "a ruby," Tam. *mânikkam* and Sanskrit *manikya*. *Mampelam*, "a mango," is said by Maxwell to be derived from the Sans. mahâ pala= "great fruit," through Telegu; but the Tamil for mango is also *mâmpalam*, and I can see no reason for assuming it to be derived from the Telegu. Some other words derived from various languages, such as Persian, Hindustani, and Arabic, would seem to have also come through the Tamil, whose influence on Malay was undoubtedly antecedent to that of Arabic. As examples I may quote *mêja*, "a table" (Pers.), Tam. *mêsai* or *mêsa*; *baki*, "balance" or "remainder" (Ar.), Tamil *bakki*; *kapi* (Beng.), "a pulley," Tamil *kappi*; *topi* (Beng.), "a hat," Tamil *toppi*; *apam*, "a cake" (given by Marsden as from Hindustani), Tam. *appam*. To the above list may be added the curious Malay word for "a bridegroom," *mempelai*, which is derived from the pure Tamil *mâpillai*, "a bridegroom." This, again, is indicative of a very early Dravidian influence on the Malays. Their previous Hindu civilization had given them the ceremony of marriage, but it was left for the Tamils to super add a special title for the man on the eve of marriage, to whose position as such the Dravidians attach an unusual amount of dignity and importance.

I think I have said enough to show the fallacy into which Marsden fell in refusing to ascribe to the Dravidians of Southern India any influence on the language of the Malays, and to make it plain that the influence of the former people over the speech and social life of the latter began at a very early date, though not so early so that of the unknown race of Hindus who reclaimed Malaya from its pristine barbarism. The Southern Indians came as traders pure and simple, bartering for the wealth of the rich tropic forests the products of civilization. They do not seem to have settled down or intermarried with the Malays to any great extent—not, certainly, so much as in Acheh, where considerable colonies of Tamils took up their permanent abode. Their object being merely commerce, they went as they came, returning year by year as the monsoon favoured. In the earlier stages of this intercourse the Malays were probably Hindus like themselves, and would thus have admitted their visitors to a greater degree of familiarity and fellowship than is now the case. Then came the Arab conversion, favoured, no doubt, by such Tamils as had already embraced Islam ; but from that time forth the Hindus became *kafirs* to the Malays, and the closeness of their intercourse declined. The commerce, however, continued as before, and the relations which the Portuguese found existing in the beginning of the 16th century were practically those which subsisted until the influx of European trade imported a new factor into the question, and the establishment of British settlements on the shores of Malaya crystallized the connection between Southern India and the Straits into what it is at the present day.

Had it not been for the successful introduction of Islam into the Far East by the proselytizing Arabs, we may suppose that the Tamil influence would have grown in strength, and perhaps eventually have led to a considerable fusion of the races, especially along the coasts. Some such fusion has in later times produced the mixed race known as Jawi Pekan ; but in this the Bengali element is quite as strong as the Tamil, owing to the large number of north Indians who came to the Straits, either as voluntary immigrants or against their will as convicts, in the days when the Straits Settlements still formed an appanage of the East India Company.

The Evolution of Malay Spelling.

By Rev. W. G. Shellabear.

Much has been written in the last hundred years on the theory of Malay spelling. Europeans, both Dutch and English, have worked out elaborate systems of orthography, and have laid down what they considered the proper rules to be followed, but the Malays have continued to spell as they please in spite of the efforts of the foreign scholars.

There is, however, at the present time so much diversity and inconsistency among the Malays themselves in regard to the spelling of even the commonest words, that it is very widely felt that a recognized system of orthography is most desirable; but Europeans have hitherto made the mistake of trying to bend the Malays to an elaborate, scientific system of foreign manufacture, the beauties of which the Malays are unable to appreciate.

A more practicable plan would seem to be to make a thorough historical investigation of the evolution of the art of spelling among the Malays, with a view to determining what is the natural trend of the changes which have taken place in the past. It seems not unreasonable to expect that such an investigation may provide a clue to the possibilities of such spelling reform as will not be distasteful to the Malays themselves, and may therefore eventually commend itself to them for universal adoption.

The materials available in Singapore are not by any means adequate for a complete and exhaustive investigation of the history of Malay spelling, but it is hoped that the following contribution to the study of this subject will at least establish some important principles of spelling reform, and will if necessary stimulate others to further search.

It is generally agreed that the Arabs gained their religious ascendancy over the Malays during the 13th century, and that it was from them that the Malays received their present written character. The earliest Malay manuscripts now extant, however, do not date back more than half of that period. In No. 31 of this

Journal I have already described some of the most interesting of these MSS., and particular care was taken to reproduce as exactly as possible the spelling of the originals. On page 107 of the paper above referred to, will be found a reference to certain MSS. belonging to the Cambridge University Library and described by Dr. van Ronkel in Part 2 of Series 6 of *Bijdragen tot de Taal- Land- en Volkenkunde van Nederlandsch-Indië.* This paper by Dr. van Ronkel provides valuable material for the present investigation, the spelling of his extracts having also been reproduced with considerable accuracy. The Cambridge MSS. were taken to Europe from the East in the first decade of the 17th century, and one of them bears the date 1604. The earliest of the Oxford MSS. bears a Mohammedan date (A. H. 1011) equivalent to the year 1602 of our era, another is almost certainly of the same date, a third is dated 1612, and a copy of the *Hikayat Sri Rama* was probably also obtained at that time, as it belonged to the same collection, and came into the Bodleian library in 1633. For information in regard to the two Leiden MSS. and the Harleian MS., which I have also made use of though they are of a somewhat later date, the reader is referred to my paper in Journal No. 31. I have also in my possession careful copies of four other manuscript letters belonging to the Leiden University, but for the purposes of this paper I will confine myself to the manuscripts mentioned above, which have already been fully described by Dr. van Ronkel and myself and are available to the reader in the Journals referred to.

As compared with the changes which have taken place in the spelling of the English language since the days of Queen Elizabeth (to whom the oldest of the Oxford MSS. was addressed) it must be said that the differences between the Malay spelling of to-day and that of three hundred years ago are very few and very insignificant indeed—an exemplification of the well-known fact that the Oriental is slow to change. Manuscripts and even printed documents of the date of Queen Elizabeth are so entirely different from modern English writings and books that they can only be read by those who have made them a special study. Our oldest Malay manuscripts, however, could be read to-day by any school boy with the greatest ease, with the exception of perhaps an unusual word or an obsolete spelling here and there.

It is remarkable that these Malay MSS., written in many different places and as far apart as Acheen and Celebes, exhibit far less divergence from one another in regard to spelling than can now be found in native letters and even in printed works from different parts of the Archipelago. In those days, no doubt, the art of writing was practised by comparatively few persons, and they may have been scribes specially instructed in the art, whereas to-day thousands of comparatively uneducated natives write letters in Malay, and even print commercial and other documents in any kind of spelling. Moreover, the old manuscripts which have survived to tell us how the Malays wrote their language in those days are mostly official documents or religious and literary productions, all of which would naturally be written by the best educated natives of the time. These considerations will in a great measure account for the greater diversity of Malay spelling which now exists, but the remarkable uniformity in the spelling of the MSS. of the 17th century can only be adequately explained by the existence of some fixed standard of spelling to which the scribes felt it necessary to conform. That fixed standard, we may presume, was the Arabic system of orthography. It was undoubtedly directly from the Arabs that the Malays received their present written character, and it is quite probable that for many years, perhaps for centuries, the art of writing may have been almost entirely confined to those Arabs who had learned the Malay language.

It should moreover be remembered that at the time of the advent of the Arabs the Malays were already scattered all over the Archipelago, from the north of Sumatra to the extreme east of Java, and even as far as Celebes and the Moluccas, and must be regarded as having been at that time merely a number of independent units divided up under the rule of a great number of petty chiefs or rajas, who were often at war with one another, and none of whom were sufficiently powerful to exercise any commanding influence over the remainder. This makes it even more remarkable that there should be such striking uniformity in the spelling of the Malay language throughout the Archipelago at the period with which we are dealing. If the Arabs had attempted to make an adaptation of their own system of spelling to suit the peculiarities of the Malay language, the result would undoubtedly have been that in different parts of the Archipelago there would have been different modifications of the Arabic spelling, and a variety of Malay spellings would have been unavoidable. The uniformity in the spelling of the earliest manuscripts would therefore lead us to expect that the system of orthography according to which the Arabs originally began to write the Malay language and which they subsequently taught to the Malays, was precisely the same as they themselves used in writing their own language. Whether this was so or not is the first point which we will examine.

It should first be stated, that Arabic can be written either with or without vowel points, and books are printed at the present time in both styles. The plain or unvowelled style is the more common, but as the entire omission of vowel points would frequently cause ambiguity, the Arabs find it necessary in certain words to use one or more vowel points. This description of the way in which modern Arabic is printed applies exactly to the way in which Malay was written 300 years ago. Several vowelled Malay MSS. are extant. One of the old Cambridge MSS. contains twelve pages of Malay fully vowelled, and in the other MSS. mentioned above, vowels are used in isolated words. In committing an unknown language to writing, it is pretty certain that the Arabs would at first use all the vowel points, if only for the purpose of recording for their own use the sounds of the new language, and in all probability Malay would continue to be written with vowels for many years, until the scribes had become thoroughly familiar with the forms of all the common words, after which they would begin to drop the vowels from such words, retaining them only in the case of unusual words or peculiar derivatives. This is precisely the way in which we find that Malay was actually written at the beginning of the 17th century.

We will now proceed to show (I) that at the time when our MSS. were written the spelling *as a general rule* conformed exactly to the rules of Arabic orthography; after which it will be shown (II) that words which at that time were sometimes written otherwise than in strict accordance with Arabic orthography were being gradually introduced with the deliberate intention of doing away with the necessity for the use of vowel points and orthographical signs, and for the purpose of making such words more legible; and lastly we will consider (III) what alterations could be made in modern Malay spelling which would produce uniformity without destroying the Malay ideal of obtaining legibility without the use of vowels, that is to say without a retrograde movement in the direction of Arabic orthography such as has hitherto been advocated by European scholars.

I. With few exceptions the spelling of manuscripts 300 years old conforms exactly to the rules of Arabic orthography.

(1) One of the first peculiarities which would be noticed by a person only acquainted with modern Malay spelling is that final *wau* and *ya* are only used in these MSS. for the purpose of forming the diphthongs *au* and *ai*. Thus we find the following words, which I have taken from all the different MSS. spelt without final *wau* or *ya* as the case may be :—

aku bagi batu berhenti bertemu bersuchi biji besi bumi bunyi chuchu
چوچ بوڽِ بوم بس بيج برسوچ برتم برهنت بات بک اکُ

dhulu dato deri diri diri-mu di-turuni erti hari hati ini isi
ايس اين هات هار ارت دترون دِرِمْ دير در داتُ دهولْ

itu jadi kali kami kamu kayu keji kembali lagi laki lalu
لال لاک لاک کمبال کج کايُ کام کامِ کال جادِ ايتْ

mandi mati mau mimpi memli menchabuli memri menyampu
مغمڤ ممر منچبولِ مملّ ممڤِ ماوُ مات مند

menjadi negri oleh-mu pergi prahu puji ratu sa-kali seperti seri
سر سڤرت؛ سکال رات ڤوج ڤراه ڤرک اولهم نکر منجاد

sa-ribu suatu suchi suka tahu terlalu Ternati tinggi tetapi
تتاڤ تڠغک ترنات ترلال تاه سوک سوچ سوات سريب

But the following words ending in a diphthong are spelt with final *wau* and *ya* in every case in which they occur in these MSS:—

angkau atau bagai berchrai birau hai harau hijau jikalau kalau

كالو جكلو هيجو هارو هي بيرو برچري باڬي اتو اغكو

kerbau limau prisai rambai rantai rantau sungai tajau

تاجو سوغي رنتو رنتي رمبي ڤريسي ليمو كربو

We find however that the scribe who wrote MS. G. had a strong prejudice in favour of final *wau* and *ya*, even in words which do not end in a diphthong, for he writes:—

bri brani budi chuchu hari kasturi lembu mentri maḍeli nafiri

نفري مدلي منتري لمبو كستوري هاري چچو بودي براني بري

negri pri putri sakti sendiri sri bahru

بهرو سري سنديري سقتي ڤتري ڤري نكري

But he also spells *hari* without the *ya*, and all other words of this kind are spelt without the *ya* as *aku*, *hati*, *lalu*, *kembali*, *mengampu*, *tetapi*, etc.

The Leiden MSS. E. and D., which were written at the end of the 17th century, contain five of such words written with final *wau* or *ya*, and F., which is also of a later date, contains three. In all the other MSS. the only instances are *kati*, which is found once, and *negri*, which is sometimes spelt with the *ya* and sometimes without, and a few names of places in MS. C. which being unvowelled would hardly be recognized without the final weak letters.

It should be remarked that some of the words given above are spelt in a way which would be quite inexplicable on any other supposition than that they were originally vowelled, and these peculiar spellings are just the ones which never vary in any of the MSS. and are still in use at the present day, as for instance:

itu	*ini*	*jikalau*	*seperti*	*suatu*
ايت	اين	جكلو	سڤرت	سوات

But though their spelling appears at first sight so peculiar, it must be remembered that according to the rules of Arabic orthography these words could not be spelt in any other way, except that perhaps جكلو might be spelt جكالو but it will be noticed later on that only one weak letter appears to have been used in any word, and that therefore, the *wau* being required to form the final diphthong *au*, the *alif* which would otherwise be inserted to mark the stress has been omitted.

It is interesting to note that the Dutchman van Elbinck, who with his own hand copied portions of the Cambridge MSS., adhered rigidly to the Arabic orthography of the originals from which he was copying, but when left to his own unaided genius in writing out a list of Malay words with their meanings in Dutch, he followed the more natural method of spelling to which the Malays have now attained, as will be seen from the following examples taken from his vocabulary, dated 1st June, 1604:—

anak	*dara*	*paha*	*susu*	*hati*	*jari*	*bahu*	*gigi*	*bulu*	*api*
انق	دارا	ڤها	سوسو	هاتي	جاري	باهو	كيكي	بولو	اڤي

At the present time the use of final *wau* and *ya* has become almost universal, and many Malays would be quite unable to read the words given above if they were spelt thus.

2. In modern Malay, for the sake of legibility, a final *alif* is usually written in such words as *bawa*, *ara*, etc. In the Arabic system of orthography, the sound of the short final *a* as it is pronounced in most Malay words is represented merely by the vowel *fathah* placed over the preceding consonant; the addition of *alif* would indicate a lengthening of the vowel. The number of Malay words, however, which have the long *a* sound in the last syllable is very small, the following being a few of them:—

bla	*tra*	*sela*	*kra*	*depa*
بلا	ترا	سلا	كرا	دڤا

These and a few Arabic words such as

dunia	*ulamá*	*hukama*
دنيا	علما	حكما

are the only ones which by the rules of Arabic orthography will allow a final *alif*. In modern Malay, however, the following forms are common :—

ara	*antara*	*bawa*	*bichara*	*bila*	*buta*	*bahwa*	*dua*	*jala*
ارا	انتارا	باوا	بچارا	بيلا	بوتا	بهوا	دوا	جالا

jawa	*jua*	*kalá*	*kota*	*kuda*	*lada*	*mulia*	*pala*	*perkara*	*pinta*	*roda*
جاوا	جوا	كالا	كوتا	كودا	لادا	مليا	ڤالا	ڤركارا	ڤنتا	رودا

sabda	*sahya*	*sedia*	*sigra*	*setia*	*tara*	*tanda*	*tua*
سبدا	سهيا	سديا	سڬرا	ستيا	تارا	تندا	توا

This spelling will not be found in these ancient MSS. It is therefore very evident that in this respect the Malay has a tendency to depart from the strict Arabic spelling of former times. Such words as the following, on the other hand, continue to be spelt without the final *alif* :—

oda	*anyaya*	*apa*	*apabila*	*bapa*	*biasa*	*binasa*	*daya*	*dia*	*hamba*	*ia*
اد	انياي	اڤ	اڤبيل	باڤ	بياس	بناس	داي	دي	همب	اي

jika	*kacha*	*kata*	*kaya*	*kerja*	*kuasa*	*lama*	*mata*	*masa*	*manusia*	*mula*
جک	كاچ	كات	كاي	كرج	كواس	لام	مات	ماس	مانسي	مول

nama	*pada*	*puasa*	*pula*	*raja*	*rasa*	*rupa*	*serta*	*suara*	*suka*	*sagala*	*tanya*
نام	ڤد	ڤواس	ڤول	راج	راس	روڤ	سرة	سوار	سوک	سڬل	تاڽ

(3) In the old Malay MSS. the weak letters *alif*, *wau* and *ya* are not used in the middle of a closed syllable to lengthen the vowel sound, except in words of Arabic origin, such as :—

fakir huruf islam jawab kitab maidan miskin

مسكين ميدان كتاب جواب اسلام حروف فقير

These words are pronounced by the Arabs with the stress on the last syllable, but the Malays, though retaining this spelling, put the stress on the penultimate, where it is found in the great majority of Malay roots. There are quite a number of words in the Malay language which have the stress upon the final syllable, and in many cases this final syllable which bears the stress is a closed syllable, but the long vowel sound which the Arab gives to the words quoted above is never heard in a Malay word, it is therefore not to be expected that the Arabs would teach the Malays to write the quiescent weak letter in such words as *sebot*, *renong*, *prang*, *dras*, *kring*, etc. As a matter of fact we never find the weak letter in such words in the old MSS.* though in modern Malay these words are frequently written

سبوت رنوڠ ڤراڠ دراس كريڠ

and we now even find such forms as the following, where the stress is distinctly on the penultimate:—

êkor habis menangis sakit sayur tanjong tulus tikus

تيكوس تولوس تنجوڠ سايور ساكيت مناڠيس هابيس ايكور

The nearest approach to the long vowel sound in a closed syllable in Malay, is to be found in the two mono-syllables *pun* and *dan*, and it is a remarkable thing that these two words are invariably written with the weak letters *wau* and *alif* respectively in all of our old MSS. and are so written up to the present time. Robinson in his "Malayan Orthography" rejects this method of spelling *pun* and *dan*, which he considers ought to be spelt ڤُنْ and دَنْ; the evidence of the old MSS. is, however, strongly in favour of the received method of spelling these words.

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* The spelling ترسبوة on p. 116, line 12, R. A. S. Journal Str. Br. No. 31 will be found on reference to the photographic reproduction of MS. A. to be a misprint.

(4) Another remarkable difference between the spelling of our MSS. and modern Malay spelling is in the use of the orthographical sign *tashdid*, which means "strengthening," and indicates that the letter over which it is placed is to be doubled or sounded twice. This sign is now hardly ever used by Malays, except in Arabic proper names, such as Allah اللّٰه and Muhammad محمّد but in our MSS. it is used with great frequency.

(*a*) It is used over the weak letters *wau* and *ya* whenever the preceding consonant bears the corresponding vowel sound, thereby showing that the said weak letter answers the double purpose of vowel and consonant. Thus the word *dia* is considered as consisting of the two syllables *di-ya*, and is written not دِيْيَ but دِيَّ and *buat* is considered as consisting of the two syllables *bu-wat* and is written not بُوْوَتْ but بُوَّت. This use of *tashdid* appears to be precisely the same as is found in the Arabic words *iyak* ايّاق *niyat* نيّة and in the termination يَّة. This appears to be sufficient to account for this method of spelling, which is found in the following words in the old MSS.,

buat	*dia*	*diam*	*dua*	*ia*	*jua*	*luar*	*muat*
بُوَّتْ	دِيَّ	دِيَّمْ	دُوَّ	اِيَّ	جُوَّ	لُوَّرْ	مُوَّتْ

This double use of the weak letter, first as vowel and then as consonant, finds its counterpart in the Dutch language, where one meets such words as *huwen*, *vrouwen*, etc., and it is therefore not unnatural that the Dutch have adopted this peculiar spelling of Malay, even in the roman character, thus:—*diya*, *buwat*, *diyam*, *duwa*, *iya*, *juwa*, *luwar*, *muwat*, etc., though one or two of the Dutch scholars have protested against the use of the *w* and *y* as being redundant. For instance Dr. Gerth v. Wijk writes in his grammar, p. 21: "Although in the Javanese, for instance, "owing to the nature of its spelling, in such words as "*boewang*, *tijang*, the *w* and *j* are written, and must be used in "tranliterating them in our character, if one wishes to reproduce "the original spelling exactly, these letters are quite superfluous "in Malay transliteration. The union of *oe* and *i* with the follow-"ing *a*, *i*, *oe*, takes place of itself in the pronunciation; we do not "write *bowa*, *kniejen*, but simply *boa*, *knieen*; and even less is *w* "or *j* necessary in *boeang*, *tiang*, etc. If the Malay wrote the "*tashdid*, it would be reasonable to represent it in the transliter-"ation. Being opposed to superfluous letters, I write *ia*, *tiap*, "*loear*, etc., which seem to me quite sufficient, as this method of "spelling represents the pronunciation as clearly as one can de-"sire."

The Malays appear to prefer to divide the syllables as follows:—*bu-at*, *du-a*, *di-am*, *ju-a*, *mu-at*, etc., for the modern Malay spelling of such words is

buat	*dua*	*buah*	*jua*	*muat*	*luar*	*sia-sia*
بوات	دوا	بواه	جوا	موات	لوار	سيا٢

(*b*) Another frequent use of *tashdid* in the old MSS. is for the purpose of doubling the consonant which follows the short vowel, called by the Javanese *pepet*, the sound of which may be described as equivalent to the short *a* in the English words "baloon," "machine," etc.

Among our old MSS. we find that Ii. 6. 45 of the Cambridge MSS. is the most consistent in this use of the *tashdid*, the following words which contain short vowels being thus spelt in the brief extract given by v. Ronkel.

bahwa	*besar*	*benar*	*dergan*	*kekal*	*kras*	*lebeh*	*telah*	*tergah*
بَهّوَ	بَسَّرْ	بَنَّرْ	دَغَّنْ	كَكَّلْ	كَرَّسْ	لَبِّهْ	تَلَّهْ	تَغَّهْ

A portion of another Cambridge MS., Gg. 6. 40, in the handwriting of the Dutchman v. Elbinck, has the following words

bahwa	*besar*	*belah*	*gumetar*	*kechil*	*sru*	*sudah*	*telah*	*tetap*
بَهوَ	بَسَّرْ	بَلَّهْ	كُمَتَرْ	كچّل	سَرُّوْ	سُدَّهَلَهْ	تلّه	تَتَّفْ

and Dd. 5. 37 of the Cambridge collection, which is in the same hand-writing, has *sa-blas tebus*

تبُّسْ سبلّس

but also *bahwa dergan lebeh telah* without the *tashdid.*

تله لبه دڠن بهو

The only other Cambridge MS. in which I have found the *tashdid* used in this way is Ll. 6. 5, which has دڠّن once, and ترسّدرْ

In the Oxford MSS. marked A. B. and C. in my paper in No. 31 of this Journal, we find the following words:

bri	*blum*	*Chelarg*	*Deli*	*dergar*	*dergan*	*glar*	*kapal*	*kapitan*
بريّ	بلّم	چلّڠ	دلّي	دڠّر	دڠّن	ݢلّر	كڤّل	كڤّتن

kati	*kekarg*	*keji*	*megat*	*memegarg*	*memeli*	*meli*	*negri*	*netiasa*
كتّي	ككّڠ	كجّ	مكّت	ممكّڠ	مملّ	ملّ	نكرّي	نتّياس

pesan	*petrana*	*Rekan*	*suka*	*suka-chita*	*Samudara*	*sudah*	*seni*	*telok*
ڤسّن	ڤترّان	ركّن	سكّ	سكچّت	سمُّدَرَ	سدّهله	سنّي	تلّق

But these MSS. have also some of these very words, and several others of the same kind, spelt without the *tashdid. Dergan* has the *tashdid* only once, in B. *Bahwa*, which almost always has *tashdid* in the Cambridge MSS., never has it in the Oxford MSS. *Dergar* is spelt without *tashdid* in A.

The Oxford MS. of "*Hikayat Sri Rama*" has the following

blas	*besar*	*betul*	*genap*	*kechil*	*selang*	*sa-telah*	*sudah*
بلّس	بسرّ	بتّل	ݢنّڤ	كچّل	سلّڠ	ستلّه	سدّه

but one or two of these are also found without the *tashdid*, as well as some which have it in the other MSS., as,

bahwa	*bri*	*dengan*	*menengar*	*tengah*
بّهو	بّري	دّڠن	منّڠر	تّڠه

It is a remarkable fact that the early Dutch translators of the Bible made a wide use of the *tashdid*, and even when spelling such words in the roman character they were in the habit of placing a stroke over a letter in place of the *tashdid*. Thus we find: "*suddah, kenna*," etc., and even the following words, which are not found in our MSS. viz.,

"*makka, padda, derri, sagalla, adda, appa, baggi.*"

Curiously enough the use of *tashdid* with the short vowel, after having completely gone out of use, was introduced once more in the middle of last century by the lexicographer van de Wall. This writer, however, does not use the *tashdid* indiscriminately with all words containing the short vowel, as appears to have been done in the old MSS., but confines its use to those words which have the accent on the short vowel. Such words for instance, as,

kras	*kekal*	*betul*	*blum*	*pegang*	*bli*	*keji*	*glar*	*blah*
کرس	ککل	بتل	بلم	ڤکڠ	بلي	کج	کلر	باله

which carry the *tashdid* in the old MSS., are written by van de Wall without it, and we find him using this sign only in such words as:—

"*dĕngngan*	*rĕdda*	*kênna*	*pĕtjtjah.*"
دَڠَّنْ	رَدَّ	کَنَّ	ڤَچَّه

In regard to this use of *tashdid* he himself says in his introduction to the first volume of his uncompleted dictionary, p. xvi: "As in the case of the vowel points and other signs, the "Malays in their ordinary writing disregard the *tashdid*, 'sign of "strengthening,' which when placed over a letter shows that that "letter must be doubled; but that is no indication of its non-exis-

“ tence or of its being unnecessary. The Malay who has learnt “ to read the Koran, not only knows what the *tashdid* is, but also “ feels the advantage of it in Malay, for if one gets him into a cor- “ ner he will at last say: *buboh-lah tashdid*, ‘ just put a tashdid “ over it.’

“ The non-use of the *tashdid* leads the Malay sometimes to “ the most peculiar spelling. For instance he is conscious that in the “ word *rĕdda*, ‘ to abate’ (as a storm or sickness) the accent lies “ on the first syllable and ought to be expressed, which it is not by “ رد or ردا ; therefore he lengthens the vowel of the ر (ĕ) and “writes راد , without troubling himself about the fact that it is “ absurd to lengthen the ĕ. Some words, which are written with “ the same letters and vowel points, could not be distinguished “ from each other without the *tashdid*, as لَتَقْ *lĕtak* (accent on the “ 2nd syllable) interj. for a certain clinking sound, and لَتَّقْ *lĕttak* “ to place. I therefore use the *tashdid* everywhere in my diction- “ ary, where the pronunciation demands it, and write رَدَّ *rĕdda*, “ دَغَّنْ *dĕngngan*, مَتَّ *mĕtta* ‘ raging.’ And do we not ourselves “ write for instance *kud-de*, *kun-ne*, indifferent as to the reason “ for doing so. It should be noted that in Malay words the “ double consonants only appear after the ĕ.”

From this it is evident that the Malay writers of the beginning of the 17th century used the *tashdid* in a different way to that advocated by Werndly, Robinson and van der Wall, and moreover none of these methods of using this sign can be regarded as being directly based upon the Arabic system of orthography. The methods invented and used by Werndly, Robinson and van der Wall were purely arbitrary, and soon fell into disuse, and there seems to be every reason to believe that the use of *tashdid* as found in our MSS. was also purely local and arbitrary, for it is a remarkable fact that all the MSS. in which this use of *tashdid* is found almost certainly came from Acheen, and I have not been able to find the *tashdid* used with the short vowel in any of the MSS. which we know to have been written elsewhere. The Oxford MSS. A. B. C. have already been proved to have come from Acheen; of the Cambridge MSS. Gg. 6. 40 contains a vocabulary written by Pieter Willemsz. van Elbinck, and dated Acheen, 1st June, 1604; Dd. 5. 37, and the 2nd part of Gg. 6. 40, which contains the writing in question, are both written by the same hand as the vocabulary, and the former closes thus (in Dutch) "end of the Story of Joseph, written the 1st October, 1604, by Pieter Willems." The only MS. therefore about which there remains any uncertainty as to whether or not it was written at Acheen, is Ll. 6. 5. of the Cambridge MSS. but there seems, from what Dr. v. Ronkel says, to be no reasonable doubt that this MS. came into the hands of Erpenius with those bearing the name of the same Pieter Willems, whom he believes to have brought all these MSS. from the East, with the exception of Dd. 9. 55., which never belonged to Erpenius.

It should not be forgotten that, at the time when these MSS. were written, Acheen was one of the most powerful Malay States. In his letter to King James (Oxford MS. C.) the King of Acheen claims sovereignty over all the rajas in Sumatra as well as Perak and Pahang on the Peninsula, and from the accounts of Lancaster's voyages he seems to have been able to enforce his authority at least as far south as Priaman (near Padang). In this connection I was interested to find the statement made by van de Wall, in his introduction mentioned above, that the original Malay spelling is known as "Achinese spelling." Where van der Wall obtained his information in regard to the name *heja Acheh* I have not been able to discover, but if it is a fact that this method of spelling, found in all its purity in our Acheen MSS. of 300 years ago, is still known by tradition among the Malays as "Achinese spelling," this would seem to point to Acheen as having been the chief centre of learning and literature at that time, and perhaps even earlier. This would entirely agree with the accounts of Lancaster's first voyages, which state that the educated Malays at Acheen spoke Arabic fluently, and Lancaster himself held intercourse with the Malays at that place in the Arabic language, having as his interpreter a Jew who spoke Arabic.

My contention therefore is, that the use of *tashdid* to indicate the short vowel sound was merely a local custom at Acheen, which the influence of even such a comparatively powerful State did not avail to bring into general use in the Archipelago. If this usage had been in accord with the Arabic orthography, it would undoubtedly have been universally adopted in the same way as the *tashdid* over *wau* and *ya* mentioned in the last paragraph (4. a.).

(5) We next come to the use of the weak letters *alif*, *wau*, and *ya* in open syllables. Their use at the end of a word has already been considered in (1) and (2). We will now inquire when and for what purpose these weak letters were used in the old MSS. in the middle of (*a*) root words, (*b*) derivatives.

(*a*) In root words, the weak letters are found in the open syllable upon which the accent falls, except in the case of the short vowel. The accent being usually on the penultimate, that is the syllable in which the weak letter is usually found.

In accordance with the rules of Arabic orthography, a weak letter when thus placed in an open syllable after a corresponding vowel is "quiescent and then serves only to lengthen the vowel which precedes it." * Thus in the word ڤاد "sufficient," the vowel of the penultimate is lengthened by the *alif*. The preposition ڤد is, however, never spelt with an *alif*; not that there is any very appreciable difference in the pronunciation of these two words, but rather perhaps on account of the fact that in conversation less stress will naturally fall upon a preposition than upon a noun, adjective or verb. This seems to be the only possible way to account for the absence of the *alif*, *wau* and *ya* in such words as

sudah maka pada deri sagala

سكل در ڤد مك سده

which in our MSS., as far as I have noticed, are the only words which do not have the lengthening weak letters in the accented syllable, with the exception of the foreign word *saudagar* which is spelt سودكر in every case, the *alif* being perhaps omitted in the penultimate on account of there being already a weak letter in the first syllable to form the diphthong *au*.

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* Faris' Arabic Grammar.

The following are words of two or more syllables having the weak letter in the penultimate,

beniaga	*chilaka*	*guru*	*hanya*	*itu*	*jalan*	*kliling*	*plihara*	*suatu*
بنياك	چِلَاكَ	كُوْرُوْ	هَاڽَ	اِيْتُ	جَاَلَنْ	كليلڠ	ڤلهار	سَوَاتُ

Kerna is invariably spelt كَارَنَ which would indicate that this word was at that time a three syllable word with the accent upon the first syllable; now it is sometimes pronounced as if it were a two syllable word.

(*b*) In derivative words formed by the juxtaposition of two roots, the lengthening weak letter is almost invariably found only in the penultimate, being entirely omitted in the first of the two words forming the compound, as:

apabila	*hulubalang*	*suka-chita*
اڤبيل	هلبالڠ	سكچيت

The same is the case in reduplications wherever the *angka dua* is not used, as,

dagang-dagang,	*mudah-mudahan,*	*raja-raja*
دكڠداكڠ	مُدَهْمُدَاهَنْ	رجراج

The omission of the weak letter in the first word in such cases is undoubtedly phonetic, the stress being strong on the penultimate of the compound.

When, however, we come to the case of derivative words formed by the addition of suffixes, we immediately meet with a difficulty which, as far as my reading has gone, has never yet been explained by any European writer, namely that when the suffix, pronoun or other particle is added to the root, the position of the lengthening weak letter is changed, and is found in the penultimate of the derivative word thus formed. For instance:

کود by the addition of the preposition ث becomes in the old MSS. كداث although the pronunciation is not *kudá-nya*, but *kúda-nya;* and جادِ becomes جديكن although the word is pronounced *jádikan* and not *jadíkan.*

The first of the Dutch scholars to point out this discrepancy between the spelling of derived Malay words and their actual pronunciation appears to have been van de Wall, who in the year 1859 wrote as follows in the *Tydschrift voor Indische Taal-, Land- en Volkenkunde*:—" But the change of position of the lengthening letter to, or its appearance in the penultimate of " root words, has in most words no influence upon the " accent, or at least very little; that is to say, the accent " is in such cases not inherent in the long vowel. In " general, the Malay retains in such cases the original accent, and " says: *bàntu*, *bàntui*, *perbàntuan*, *bàntu-nya*, etc., *sèwa*, *sèwakan*, " *sèwaï*, *persèwaän*, *sèwa-nya*, etc. But as the literary Malay always has an inclination to modify the pronunciation of the " people according to the way a word is written, he also lays a " stress to some extent on the syllable which has the long vowel, " so that there come to be, as it were, two accents—a strong or " commanding one, the natural accent of the root, and a weak one, " the grammatical accent on the long vowel. The variations between strong and weak are very numerous, in different words " and with different individuals, and there exists no fixed rule; " there are even words, though very few, in which owing to the " change in the position of the long vowel the natural accent of " the root is entirely lost and only the grammatical accent remains; e.g. *katà-nya*, from *kàta; tambàŋan* from *tàmbaŋ;* " though one also hears *tàmbaŋan.*"

Three years later, in Vol. XII of the same Journal, A. B. Cohen Stuart raises a somewhat half-hearted protest against van de Wall's statement in regard to the pronunciation of such words. He says (page 68): " It is not without hesitation that " I venture some objections to this proposition. I feel how " unfavourably I am situated as compared with Mr. van de Wall

" in regard to a subject about which he is in such an infinitely
" better position to form a correct opinion. I was therefore at
" first inclined silently to accept as information his observations
" as to accent; after further consideration, however, I found it
" preferable to come forward fearlessly with my doubts, and to
" expose myself if need be to a crushing reproof, if this should
" be able to bring me, and perhaps others also, to a better view
" on the subject.

" I confess then that I have hitherto been under the convic-
" tion that in Malay the accent in derived as well as in root
" words fell as a rule upon the penultimate; that on the addi-
" tion of a suffix the position of the accent changed as a rule
" from that which was originally the penultimate to that which
" was originally the last syllable; and that the pronunciation
" which according to Mr. van de Wall is the true and natural
" one, was quite peculiar to Europeans. It is so, I believe, in
" Javanese. It is true that there the accent does not come out so
" clearly as in Dutch, and in the Javanese grammar of T. Roorda
" (§ 87) the very existence of any accent in Javanese is denied;
" but what is there called 'a slower or more sleepy pronunciation
" of the two last syllables of every polysyllabic word' is more cor-
" rectly interpreted, as it seems to me, as being a real accent on
" the penultimate, and a drawing out or longer holding on to
" the last syllable. Indeed, if one pronounces *túlis*, for instance,
" in the pure Dutch style with a clear accent on the penultimate,
" though this may not give the exact Javanese pronunciation, it
" is certainly much nearer to it than if one should say *tulìs*, with
" an equally plain accent on the last syllable; and similarly the
" pronunciation of the same word with the affix *an*, would, I
" believe, be better represented by *tulíssan* or *tulísan* than by
" *túlisan* or *tulisàn*. If the word is again increased by the addi-
" tion of another suffix, so that the original accented syllable is
" separated from the new suffix by one or more syllables, then
" besides the principal accent, which goes over to the last, the
" original accent again makes its appearance to some extent, as
" in *túlisáne*, *ŋgáturáken*. In a word, without digressing further,
" my proposition in the main is this: that in Javanese at any
" rate there actually is in the pronunciation of every word of
" two or more syllables a sort of stress, which can properly be

“ called an accent, and is usually situated in the penultimate,
“ and with the addition of an affix changes its position to the
“ new penultimate. The fact that Europeans pronounce both
“ Javanese and Malay words so frequently, I might say almost
“ always, with the accent on the ante-penultimate, even when
“ this is merely a grammatical prefix, and say for instance
“ *túlisan*, *Pángeran*, *Kálitan*, *Páchitan*, would surely be the
“ strongest argument against that assertion, if that pronunciation
“ must be considered as having its origin in an unprejudiced con-
“ ception of the native pronunciation. But the Javanese and
“ Malay words which are most used by Europeans are generally
“ learned not so much by conversation with the natives as from
“ writings, in which owing to faulty transliteration the exact
“ pronunciation and particularly the accent are left quite uncer-
“ tain. For one European who first learns to pronounce say the
“ word *Pangeran* from the Javanese, there are perhaps twenty
“ who became acquainted with it only or in the first place
“ through European conversation or writings ; and even if one
“ afterwards had the opportunity of hearing it pronounced by
“ natives, then one would have to pay a good deal of attention
“ and must have some interest in the subject in order to re-
“ cognize and to abandon a wrong pronunciation which one has
“ once appropriated ; especially when it is so generally accepted
“ among our fellow countrymen that it would appear to be
“ pedantic or eccentric to deviate therefrom. If one considers
“ that in Dutch and kindred languages the accent, far from
“ having any preference for the penultimate, usually falls fur-
“ ther back, one will not be surprised to see this tendency in the
“ European pronunciation of native words. This phenomenon
“ therefore has in my opinion no more value in deciding the true
“ native pronunciation, than one would be justified in doubting
“ that the name Palembang should properly be pronounced
“ Palémbang (Javanese *pa-lém-bang*) because the majority of
“ Europeans, even if they have lived there for years, called it
“ Palĕmbàng ; or that the place where I am writing this is called
“ Sålå, because Europeans, although they know better, never
“ call it anything but Solo among themselves.

“ As regards Malay, no one is less able than myself, espec-
“ ially in opposition to Mr. v. d. Wall, to refer to my own

“ observations on the native pronunciation. So let us rather
“ consider what others have said on the subject. In Marsden
“ (Elout's translation p. 202) I only find the general statement,
“ that the accent usually coincides with the long vowel, and
“ falls by preference upon the penultimate, but without further
“ elucidation of peculiarities. De Hollander (*Handleiding tot*
“ *de beoefening der Mal. taal- en letterkunde*, 2nd ed., Breda,
“ 1856) says on the accent in words having only one suffix
“ (page 23, § 7), that they are pronounced both ways, either
“ with the accent on the syllable which had the accent in the
“ root (*mendápatkan*, *karádjaän*) or on the penultimate of the
“ derived word (*mendapátkan*, *karajáän*), and nothing further. By
“ Werndly (*Mal. Spraakkunst*, Amst. 1736) the subject is treat-
“ ed more fully (p. 45 *et seq.*), and in the following manner,
“ namely that the suffixes *kan*, *i*, *an*, *ku*, *mu*, *nya* always cause the
“ accent to change its position to the syllable immediately pre-
“ ceding them, whether that syllable be open or closed ; that
“ the same thing takes place before *kah*, *tah*, *lah*, if a vowel,
“ diphthong or *h* precede them ; while on the other hand, if
“ another consonant precedes one of these three suffixes, the
“ accent shifts to the preceding syllable or remains un-
“ changed at will (*sambót-lah* or *sámbot-lah*) ; and that
“ the change of accent results in the change from long
“ to short vowel and vice versa, except when the final
“ consonant meets the initial consonant of the suffix, as
“ *jâlankan*. In the new edition of Werndly's grammar by
“ Angelbeek (Batavia 1823, p. 38) it is only stated in general
“ that in words of two or more syllables, whether they be roots,
“ or compound or derived words, the accent falls usually upon
“ the penultimate, and that ‘the syllable on which the accent
“ falls must naturally be pronounced longer than the others.’ I
“ do not know how much reliance can be placed upon the testi-
“ mony of these writers on such a point as this ; certainly under
“ the most favourable circumstances they can hardly outweigh
“ the dictum of Mr. van de Wall ; but their rule, as regards the
“ cardinal point, seems to me to find such strong support, on the
“ one hand in the analogy of the Javanese language, and on the
“ other in the indications given by the spelling of Malay in the
“ Arabic character, that even the dictum of Mr. van de Wall,

“ while it shakes my belief in their accuracy, has not been able to “ destroy it; and so much the less because Mr. van de Wall's “ presentation of the subject is itself not quite clear. He says “ (73, 399) ‘ the first result of the suffixes *kan*, *i*, *an*, *nya*, *ku*, *lah*, “ *tah*, *kah*, on roots which end in an open syllable is, that they lengthen the vowel of that syllable and cause the original long “ vowel of the root to drop out; . . . . . . the suffixes *an* and “ *i*, since they begin with a vowel, cause the same result in “ words which end in a closed syllable, and in that case the final “ consonant of the root becomes the initial letter of the suffix “ with the corresponding vowel . . . . . . while the other “ suffixes leave such words unchanged . . . . . . ; but the “ change of position of the lengthening letter to or its appear-“ ance in the penultimate of root words (read, of *derived* words ? “ or in the *last* syllable of root words) has in most words no in-“ fluence upon the accent, or at least very little; that is to say, “ the accent is in such cases not inherent in the long vowel.’

“ Here first of all the question arises : is the change of posi-“ tion of the lengthening letter a mere graphic phenomenon, “ does it only exist in the Malayo-Arabic character and the trans-“ literations thereof, or does the same change in the length of “ the vowels take place in the pronunciation ? If this is maintain-“ ed, I must then further ask how such a rule can have arisen in “ the written character, a character which so to speak does not “ belong to the language, and if such were the case might be “ expected to have preserved in this respect the traces of a long “ obsolete condition of the language or perhaps of some kindred “ dialect, but which, borrowed from an entirely foreign language “ and probably first applied to the Malay in comparatively recent “ times, must be reckoned as rendering the native pronunciation in “ common use as accurately as the foreign characters will allow ? “ I could understand that the retention of the original spelling of “ a root ending in a consonant when followed by a suffix beginning “ with a consonant, might arise from an idea of producing legi-“ bility, so as not to entirely deprive the word of vowel signs, “ and that one might therefore write for instance منداڤتکن “ although perhaps (according to Werndly) مندڤتکن might better

" represent the pronunciation ; but how could anyone think of " writing ڤندڤاتن if in this derivative, as in the root, the first *a* is " to be pronounced long and the second short, or above all things " how could this spelling come into general use ? If, however, in " this respect the pronunciation agrees with the spelling, " then though allowing that the length of the vowel is something quite different from the accent, it would be difficult for me " to imagine such a change in the first syllable and in the division " of the syllables otherwise than in connection with and a result " of a corresponding change in the position of the accent. Even " if it be admitted that the first change could be imagined without the last, and that it actually exists in Malay, how can one " conceive that the ' inclination to modify the pronunciation of " the people according to the way a word is written, ' could lead " to the alleged tendency of literary Malays to place, in addition " to the natural accent, a second, grammatical accent on a syllable which properly had no claim whatever to any accent at " all ? Indeed in that case the written word is already, without " that misplaced accent, in entire agreement with the true pronunciation ; but then the Malay himself must comprehend too " well the difference between length and accent to confuse the " one with the other and thus to let himself be misled into such " an unnatural pronunciation.

" Moreover, that the Arabic character, by its imperfect representation of the pronunciation and especially owing to the " habit of omitting the vowel points, has really exercised some " influence upon the pronunciation, can, I believe, be properly inferred from some corruptions which find therein a complete explanation. I find a strong example of this in the word مرݢستو " which is pronounced *margastoewa*, instead of *mregá-sattwa*, as it " should be sounded according to the Sanskrit spelling. There " would certainly be nothing astonishing about this corruption " in itself ; but it is difficult to ascribe to mere chance the fact " that the corruption is just of such a kind, as is favoured by the " illegible manner of writing without vowels ; to which the fact " that it is probably not an everyday word may also have contributed. The same thing, though with less foundation, may

" be supposed in regard to ستي منسي pronounced *satia*, *manusia*, " with three and four syllables, in place of *satya*, *manusya*, with two " and three syllables. Perhaps in the same way the spelling " منداڤتكن might have caused the change in the pronunciation " from *mendapátkan* to *mendápatkan* ; but in grammatical forms it " is more difficult to admit that much an influence upon the " pronunciation of the people could have come from a compara- " tively recent written character. And for the influence which " Mr. van de Wall ascribes to it, I can not even find a reason- " able cause."

These extracts have been translated from the Dutch, and are given here at such great length for the benefit of those to whom the Dutch Journals are not available. Before stating my own views on this question of the spelling and pronunciation of derived words, it seemed only fair to give the reader the facts and arguments which have already been used on both sides.

There can be no question but that, as stated by Cohen Stuart, the Dutch scholars up to the time of van de Wall universally held that the Malays actually pronounce such words as they are written. How they can have been led to this conclusion can perhaps be understood when it is considered that their study of the Malay language was prosecuted for the most part in Java or in places which are under strong Javanese influence. Robinson formed this opinion because he learnt the language in Batavia and Bencoolen. Marsden also studied at Bencoolen, and wrote his grammar and dictionary in England, where of course he had not the advantage of native help.*

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* The Dutch scholar H. N. van der Tuuk seems to have had no personal knowledge of the way in which the Malays of the Peninsula pronounce derived words, for he wrote in 1866 in his notes to Abdullah's *Pancha Tandaran*:—" دکتهويڽله The writer always spells thus, and not " دکتهويڽاله and so also he spells ماتيله and not متيله بكمانكه and not " بكمناكه; سياڤكه and not سيڤاكه. In the Menangkabau dialect the accent

Whether the Dutch scholars of the present generation have universally accepted van de Wall's dictum in regard to the change of accent in derived words, I am unfortunately not in a position to know, the Library here not being very well supplied with the latest Dutch works on the Malay language, but as far as I am able to discover, the grammar of Gerth v. Wijk, published in 1893, is now considered the best Dutch work on the Malay language. This author is in entire agreement with van de Wall, for on page 46, para. 96, he writes: "The original, "natural accent (of the root word) is usually retained when the "word takes a suffix, e. g., *bànding*, *bàndingan*; *kùmpol*, *kùmpolan*; "*dàpat*, *mendàpati*; *lèmpar*, *melèmparkan*. And the phenomenon here "presents itself, that if the accent is not very easily distinguishable "in the root word, it sometimes comes out clearer in the derived "word, e. g., *bĕ̀rgis*, *kabĕ̀rgisan*."

After quoting from van de Wall part of the passage which we have given above, Gerth v. Wijk adds: "The tendency "to change the position of the accent more or less is chiefly "noticeable, as it seems to me, in words which have the *a* sound "in the last syllable; such a pronunciation, however, as *kudà-* "*nya* from *kùda*, *padà-nya* from *pàda*, whereby the first syllable "of the root entirely loses its accent, which falls wholly upon "the second, as is the case with *katà-nya*,† can only be attribut- "ed to European-Javanese influence; one never hears it from "the Malay."

We shall see later on that van Wijk is probably correct in attributing to Javanese influence this mistaken idea about the change of the accent to the penultimate in all derived words. It seems necessary, however, before going into that question, to inquire first of all which are the words in the Malay language that actually do undergo a change of accent. In order to make an independent investigation of this subject I have written out a list of derived words and have caused them to

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"of a word does not change its position on the addition of the particles *lah*, "*kah* and *tah*. From the spelling of Abdullah it would appear that this is "also the case in the Malay of Malacca."

† Where van de Wall and van Wijk came across this pronunciation of *kata-nya* I cannot imagine. The Malacca and Johor pronunciation certainly gives an accent identical with *kùda-nya*.

be read in my hearing by a number of Malays, with the result that I have only been able to detect an entire change of accent in the following classes of words :

(*A*) In some words derived from roots ending in *aŋ* by the addition of the prefix *an*, as *tímbaŋ*, *timbáŋan ; láraŋ*, *laráŋan ; bílaŋ*, *biláŋan ; dágaŋ*, *dagáŋan ; pándaŋ*, *pemandáŋan.*

(*B*) In some derived words formed by the addition of the suffix *i*, as : *búka*, *buká’i ; sérta*, *sertá’i ; múla*, *mulá’i* ; *túrun*, *turúni ; táhan*, *taháni* ; *kásehan*, *meŋaseháni.**

(*C*) In some polysyllabic derived words formed with the suffix *i*, the accent is carried forward to the suffix *i* on the addition of the possessive pronoun *nya*, as, *jálani*, *di-jalaní-nya ; meŋóbati*, *di-obatí-nya-lah.* This should probably be attributed to the difficulty of pronouncing the consonant *nya* following the vowel *i*, which necessitates a pause.

In the majority of words the root most distinctly retains the original accent, as for instance *jádi*, *jádikan ; mákan*, *mákanan ; déŋar*, *kedéŋaran ; óbat*, *meŋóbati ; sálah*, *kesálahan ; súrat*, *di-súrat-nya-lah.* It would be ridiculous to pronounce these words, *jadíkan*, *makánan*, *kedeŋáran*, *meŋobáti*, *kesaláhan.*

There are, however, a large number of derived words, chiefly words of four or more syllables, in which the original accent almost or perhaps entirely disappears, without, however, any particular accentuation of any other syllable, the word being pronounced with an equal stress on all the syllables. Such words are : *perkata’an*, *kekaya’an*, *menjalani.*

Taking the pronunciation of the above-mentioned words into consideration, it would be easy in the case of the words in (*A*) and (*B*) to account for the position of the strengthening letters, *alif*, *wau* and *ya* ; and even in the case of the words given above where the stress is equal on all the syllables, one could understand the omission of the strengthening letter from its proper place in the root, though its transference to the penultimate would be difficult to explain ; but when we come to such a spelling as,

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* It should be noted that in such roots as *turun* and *tahan* the stress is nearly equal on the two syllables, the change of stress in *turuni*, *tahani* is therefore very slight.

perbuátan .perarákan pekerjá'an jadíkan katákan di-perlakúkan

دڤرلكوكن كتاكن جديكن ڤكرجاٴن ڤرراكن ڤربواتن

it becomes simply impossible to account for it on any theory of phonetics, unless indeed one is prepared to admit the possibility of a complete change of pronunciation in the short space of 300 years, which appears to me to be out of the question.

There is, however, it seems to me, a much more feasible explanation of this peculiar discrepancy between the spelling and the pronunciation of those words, and that is to be found in the existence of a cognate language, the Javanese, in which it is admitted that the accent in derivatives actually does change its position and fall upon the penultimate. Moreover the probability that Javanese was the pattern from which this peculiar Malay spelling was copied becomes still stronger when it is pointed out that Javanese words of this kind are written in the Javanese character in a way which has quite a strong analogy to this peculiar use of the strengthening letters in the penultimate. As the Javanese characters are not obtainable in Singapore it has been necessary to resort to the arrangement given below, which represents as nearly as it is possible in Roman characters the way in which such words are spelt in the Javanese character.

i i
éb gl. éb gl n. gn gn y run h. run h hn.
l t t tu tu

bé-gal bé-gal-lan gan-ti gan-ti-ya run-tuh run-tuh-han

بيكالن بيكللن بيكل كنتي كنتي رنتوهن رنتههن رنته

iŋ iŋ i
a nk. a n ék p r m r ŋ
k

a-nak a-nak-ké pa-riŋ ma-riŋ-ŋi

اناكي انقكي انق ماريڠ مارڠڠ ڤارڠ

It will be seen from the above that in Javanese the addition of the suffix *an*, *a*, *ê* or *i* doubles the preceding letter. Thus, the addition of *ê* to *anak* produces not *anakê*, but *anakkê*, the accent being shown in this way to be on the penultimate. When Javanese is written with Arabic characters, the weak letter *alif*, *wau* or *ya* is substituted for one of the double letters used in the Javanese character.

The resemblance between these Javanese forms* and the spelling of Malay derivatives is so close that it amounts almost to a demonstration that the Javanese or some similar character was the medium through which the use of the strengthening letter in the penultimate came into Malay spelling, regardless of the pronunciation. The question has been raised before whether the Malays had a written character of their own, before they adopted the Arabic character. If that were so, analogy would naturally lead us to suppose that such a character would, like the Javanese, be based upon the Sanskrit, and that would make the step from the Javanese to the Malay spelling of derivatives which has been outlined above still easier. †

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* These Javanese double-letter forms can still be traced in Malay in the double *k*, which has no doubt survived owing to the existence of the two letters *kaf* and *kuf*. Thus we find that the Malays invariably use this method of spelling the words given below :

كباپقكن ممبايقكي منابقكي ڤرانقكن كأيسقكن

although the Dutch scholars have endeavoured for more than a century to introduce what they consider more correct forms of spelling, namely :

كبپاكن ممبايكي منايكي ڤراناكن كأيسوكن

The fact that the Malays refuse to adopt these European spellings and retain the double-letter forms, is to my mind at once a strong argument in favour of their retention and an additional evidence in favour of the theory that the spelling of Malay derivatives can only be explained as being based upon the Javanese system of spelling.

† Werndly, in the introduction to his grammar, written 170 years ago, says on page 50 : "The first language from which the Malay language has "borrowed some words is her neighbouring and kindred friend and sister the "Javanese language, *with which many persons conjecture that she for-*

We will now proceed to inquire:

II. What changes have the Malays introduced in their spelling during the last 300 years with a view to greater legibility.

It has already been pointed out in I. (1) that it is now the almost invariable custom of the Malays to write final *wau* and *ya* in words which end in the vowels *e* and *i*, *o* and *u*, as well as in those which end in *ai* and *au*. This change has been accepted by van de Wall, Pijnappel, Klinkert, v. Wijk, Wilkinson, and all other modern European authorities.

(2) The use of final *alif* for words ending in the *a* sound, has not, however, been accepted by any of the above-mentioned lexicographers, except in those words which have the stress on the final syllable, as *sela*, *kra*, etc. The extent to which the final *alif* is now used appears, however, to justify the practice, in view of the fact that it renders a large number of words far more legible, and in the absence of any counteracting disadvantage. In the new Malay Spelling Book, No. 1, now used in the vernacular schools of this Colony, the following words are found with final *alif:*

bangsa	*bawa*	*bisa*	*benda*	*buta*	*china*	*choba*	*chita*	*dada*
بڠسا	باوا	بيسا	بندا	بوتا	چينا	چوبا	چيتا	دادا

denda	*depa*	*gila*	*husta*	*hêla*	*hêja*	*kena*	*kuda*	*lada*	*lusa*
دندا	دڤا	گيلا	هستا	هيلا	هيجا	كنا	كودا	لادا	لوسا

muda	*nyala*	*rusa*	*sahya*	*sisa*	*semoa*
مودا	پالا	روسا	سهيا	سيسا	سموا

Whereas the following are written without final *alif:*

adā	*apa*	*bacha*	*bapa*	*bagimana*	*biasa*	*buka*	*choba*	*dia*
اد	اڤ	باچ	باڤ	بگيمان	بياس	بوك	چوب	دي

"*merly had one and the same written character in common*, and now still has "in common a large proportion of words, which cannot well be distinguish- "ed except by those who know how to compare them, and by some deriv- "ations which are peculiar to the one language rather than to the other."

guna	*hamba*	*herga*	*herta*	*kata*	*kerja*	*kerna*	*kita*	*kota*
ڬون	همب	هرڬ	هرت	كات	كرج	كارن	كيت	كوت
lama	*lima*	*luka*	*lupa*	*mana*	*masa*	*mata*	*muka*	*nama*
لام	ليم	لوك	لوڤ	مان	ماس	مات	موك	نام
nyata	*pada*	*punya*	*raba*	*raga*	*rasa*	*rata*	*sana*	*serba*
پات	ڤد	ڤوڽ	راب	راڬ	راس	رات	سان	سرب

siapa	*suka*	*werna*	*werta*
سياڤ	سوك	ورن	ورت

In the lithographed 1st editions of the *Hikayat Abdullah*, and *Pancha Tandaran*, which Munshi Abdullah wrote with his own hand, such words are in almost every instance spelt in precisely the same way as the Spelling Book, as the following will show:

bangsa	*bawa*	*bichara*	*bila*	*blanga*	*blanja*	*bunga*	*china*	*chendana*
بڠسا	باوا	بچارا	بيلا	بلاڠا	بلنجا	بوڠا	چينا	چندانا

dada	*depa*	*dosa*	*dua*	*êja*	*kapala*	*kena*	*nama*	*nyala*	*onta*
دادا	دڤا	دوسا	دوا	ايجا	كڤلا	كنا	نما	پالا	انتا

perkara	*pinta*	*penglima*	*penjara*	*preksa*	*sabda*	*sahya*	*seksa*
ڤركارا	ڤنتا	ڤڠليما	ڤنجارا	ڤرقسا	سبدا	سهيا	شقسا

senjakala	*singa*	*telinga*
سنجاكالا	سيڠا	تليڠا

and without *alif*,

ada	*apa*	*bacha*	*bahasa*	*berniaga*	*benchana*	*cherana*	*derhaka*
اد	اڤ	باچ	بهاس	برنياڬ	بنچٰان	چران	درهك

dia	*juga*	*kata*	*kerja*	*kerna*	*kita*	*kreta*	*mana*	*mata*	*minta*
دي	جوڬ	كات	كرج	كارن	كيت	كريت	مان	مات	منت

pada pula punya rupa sengaja senjata

سنجات سغاج روڤ ڤون ڤول ڤد

(3) The insertion of the weak letters *wau* and *ya* in closed syllables appears to be a growing habit. It is this tendency of the Malays to use the weak letters which van de Wall sarcastically characterises as "kitchenmaid spelling." No amount of sarcasm, however, will counteract this inevitable tendency, which is not the result of ignorance at all, but rather of a set determination to make words more legible. The only concession along this line which van de Wall is willing to give the Malay is: "If the last letter of a word is a final *h*, a mere aspirate, then he is free to express the vowel of the previous letter "if it is a *kasrah* (*i*, *e*) or *dlammah* (*o*, *u*) by the corresponding "lengthening letter, e. g. ڤديه *pedih* رنتوه *runtoh*."

Robinson went further than this, and wished the weak letter to be inserted in some words which are ambiguous, as,

ampat umpat tulis tulus

تولوس توليس اومڤة امڤة

The modern practice of the Malays themselves, however, goes further still. Abdullah wrote:

apit bangun blum betul gantong gadoh hanchor hidong ikut

ايكوة هيدوڠ هنچور كادوه كنتُڠ بتول بلوم باڠون اڤية

kawan-nya kechil keping kris kulit lantek masing menangis pedeh

ڤديه مناڠيس ماسيڠ لنتيق كولية كريس كڤيڠ كچيل كاوانڽ

ringgit sabot saudagar sebot sungkor tanggoh taroh tekun

تكون تاروه تڠكوه سڠكور سبوة سوداكر سابوة رڠكية

telut trus tuan

توان تروس تلوة

He retained, however, the old form of spelling in the words:

balek	*gantoŋ*	*habis*	*hidop*	*kampoŋ*	*paŋgil*	*puteh*	*telok*	*tiŋgal*
بالق	ڬنتڠ	هابس	هيدڤ	كمڤڠ	ڤڠڬل	ڤوته	تلق	تڠڬل

The new Spelling Book referred to above goes even further than Abdullah, giving

aŋin	*baŋan*	*blum*	*gantoŋ*	*guntiŋ*	*minum*	*payoŋ*
اڠين	باڠون	بلوم	ڬنتوڠ	ڬونتيڠ	مينوم	ڤايوڠ

rumput	*sakit*	*sedikit*	*takot*	*tanjoŋ*	*tidor*	*toŋkat*	*tuŋgal*
رمڤوة	ساكية	سديكية	تاكوة	تنجوڠ	تيدور	توڠكة	توڠڬل

tumpah	*umpat*
تومڤه	اومڤة

But retaining the old forms

bintaŋ	*habis*	*kampoŋ*	*paŋgil*	*tiŋgal*
بنتڠ	هابس	كمڤڠ	ڤڠڬل	تڠڬل

(4) As stated above, the *tashdid* is now never used.

(5) The insertion of the lengthening letters in the penultimate of derived words appears to have become firmly fixed in the mind of the Malay, and is still very generally practised. We find the following in the new Spelling Book:

aŋkatan	*bacha'an*	*makanan*	*pemandaŋan*	*pemblian*
اڠكاتن	بچأن	مكانن	ڤمنداڠن	ڤمبلين

perkata'an	*tanaman*	*taŋkapan*
ڤركتأن	تنامن	تڠكاڤن

which are absolutely in accord with the spelling of our MSS.

But we also find several words which are not written in the same way, e.g.

baŋunan	*minuman*	*paŋgilan*	*pembunohan*	*pencharian*	*pendapatan*
باڠونن	مينومن	ڤڠڬلن	ڤمبونهن	ڤنچارين	ڤنداڤتن

peŋharapan	*peŋlihatan*	*petarohan*	*petutoran*	*pukolan*	*tulisan*
ڤڠهارڤن	ڤڠليهتن	ڤتارهن	ڤتوتران	ڤوكلن	توليسن

which according to the old spelling should be

ڤڠهراڤن ڤندڤاتن ڤنچرين ڤمبنوهن ڤڠڬيلن منومن بڠونن
تليسن ڤكولن ڤتتورن ڤتروهن ڤڠلهاتن

The new spelling of these words is certainly a very strong confirmation of what is stated above in regard to the position of the accent, and surely no one can deny that the new spelling is very much more legible than the old.

Abdullah writes:

apa-kah	*bacha'an-nya*	*bantahan*	*bagimana-kah*	*di-bachakan*
اڤاكه	باچأنڽ	بنتاهن	بڬيمانكه	دبچاكن

di mana-lah	*fikiran*	*hadapan*	*hampiri*	*ia pun*	*jambatan*
ديمانله	فيكران	هادڤن	همڤيري	ايڤون	جمباتن

kbêbasan	*kerja-nya*	*kedeŋaran*	*kedudokan*	*ke'êsokan*
كيبباسن	كرجاڽ	كدڠرن	كدودقكن	كأيسقكن

kelakuan	*kelihatan*	*kesalahan*	*kesenaŋan*	*kesudahan*	*kesusahan*
كلكوان	كليهاتن	كسلاهن	كسناڠن	كسداهن	كسوساهن

kuroŋan	*mendataŋkan*	*pakaian*	*peranakan*	*perhatian*	*permula'an*
كوروڠن	منداتڠكن	ڤكاين	ڤرانقكن	ڤرهاتين	ڤرملأن

perganan puasa-lah rupa-nya tambahan

تمباهن روڤاڽ ڤواسله ڤڠانن

It will be seen that the spelling of many of these words is nearer to the spelling of the 17th century than the new Spelling Book, but the strong tendency to change the spelling in the direction of the pronunciation is very evident.

III. Is it possible to formulate rules which will fix the spelling of Malay according to the modern native ideal, i. e., legibility without vowel points?

Undoubtedly it should be accepted as an axiom that the Malays should continue to spell the common words as they have been accustomed to do for centuries; the spelling of these few words is easily learnt, and it would now be next to impossible to change them, e. g.,

ini itu jikalau kerna sagala seperti suatu deri-pada

درڤد سوات سڤرت سݢل کارن جکلو ايت اين

melainkan ketahui

کتهوي ملينکن

Also Arabic words, which have retained the original spelling although the pronunciation has changed, should not now have their spelling altered, as,

dunia jawab miskin umur

عمر مسکين جواب دنيا

The first rule (1) would be, spell with final *wau* and *ya* respectively all words which end in any of the sounds *e*, *i* and *ai* or *u*, *o* and *au*.

(2) All words ending in the *a* sound should be spelt with final *alif*, except those words in which the last consonant is ڽ گ ڬ چ ج ب and a few common words such as

ada apa apabila dia ia kerna manusia mula pada pula

ڤول ڤد مول مانسي كارن اي دي اڤبيل اڤ اد

serta siapa

سياڤ سرت

Provided, however, that the final *alif* may also be omitted when the last consonant is ت س م ن or ي whenever those consonants are preceded by an *alif*, as in the following words:

bagimana biasa daya kata kaya lama mana masa mata nama

نام مات ماس مان لام كاي كات داي بياس بكيمان

nyata puasa rasa rata sama sana supaya

سڤاي سان سام رات راس ڤواس ڽات

(3) The following rules are suggested to govern the insertion of the weak letters *wau* and *ya* in closed syllables (it being understood of course that *alif* is never thus used except in the monosyllable *dan*).

(*a*) In two-syllable roots, when one syllable is open and the other closed, the weak letters *wau* and *ya* shall be inserted in the closed syllable, except when the vowel sounds of the two syllables are similar. Examples of words with similar vowels:—

bilek bodoh bohoŋ boŋsu bunoh dusun fikir mimpi soroŋ susun

سوسن سورڠ ممڤي فيكر دوسن بونه بڠسو بوهڠ بوده بيلق

tiŋgi titek toloŋ tulus turun

تورن تولس تولڠ تيتق تڠكي

Examples of words with dissimilar vowels:—

aŋin blum gadoh hidop ikut kasut kechil kepiŋ

كڤيڠ كچيل كاسوة ايكوة هيدوڤ كادوه بلوم اڠين

kriŋ	*payoŋ*	*taroh*	*tidor*	*timpa*	*tonda*	*tulis*
كريڠ	ڤايوڠ	تاروه	تيدور	تيمڤا	توندا	توليس

(*b*) When both are closed syllables, the weak letter should only be inserted in the second syllable if the vowel sounds of the two syllables are similar.

Examples:—

benteŋ	*dindiŋ*	*riŋgit*	*tindeh*	*tumboh*	*tundok*	*tuŋgul*	*unjok*
بنتيڠ	دنديڠ	رڠݢية	تنديه	تمبوه	تندوق	تڠݢول	انجوق

(*c*) If the sounds are dissimilar, one being the *a* sound and the other *wau* or *ya*, the *wau* or *ya* must be written in whichever syllable it occurs. Thus:

bimbaŋ	*bantiŋ*	*bintaŋ*	*kambiŋ*	*kumbaŋ*	*taŋgoŋ*	*tuŋgaŋ*
بيمبڠ	بنتيڠ	بينتڠ	كمبيڠ	كومبڠ	تڠݢوڠ	توڠݢڠ

(*d*) If the vowel sound in one syllable corresponds to *wau*, and in the other to *ya*, then both should be written, as: كونتيڠ

It will, of course, be understood that it is quite impossible in this way to represent all the possible permutations of vowel sounds that may be formed with the same consonants. This could only be done with vowel points. The great majority of words in ordinary use will however be covered by the above rules, and something must be left to the imagination of the reader.

(*e*) In such common words as *tiŋgal* and *paŋgil*, it is doubtful whether the insertion of the *ya* would be of any use. The Malays are so accustomed to the spelling تڠݢل and ڤڠݢل for these words that careless readers invariably pronounce these forms *tiŋgal* and *paŋgil* even when they stand for *taŋgal* and *peŋgal*, and would certainly continue to do so even if *tiŋgal* and *paŋgil* were spelt تيڠݢل ڤڠݢيل and as most Malays strongly object to the insertion of the *ya* in these words, I would advocate its omission, for the present at any rate. Similarly a few other very common words might be spelt without the weak letters, as:

minta pinta pintu jumpa chinta habis puteh timbul boleh oleh

اوله بوله تمبل ڤوته هابس چنتا جمڤا ڤنتو ڤنتا منتا

ratus mulia himpon êsok lebeh

لبه ايسق همڤون مليا راتس

(4) The *alif* should be used, as explained above, in all words where in the old MSS. a *tashdid* is found over *wau*, as in

buah buat dua jua prempuan tuan luar

لوار توان ڤرمڤوان جوا دوا بواة بواه

This use of *alif* does not appear to be necessary where *tashdid* is found over *ya* in the old MSS., for the Malays never spell otherwise than

سکلين کنتين ڤمبلين

(5) (*a*) In root words, the use of the weak letters to lengthen the vowel sound in open syllables requires but few remarks. In words of two syllables, these lengthening letters are almost invariably found in the first syllable, the exceptions being those words in which the accent falls on the last syllable, the first syllable having the short vowel sound, as:

bla kra sela tra

ترا سلا کرا بلا

In three-syllable roots, the lengthening letter is placed in the penultimate; but in one or two words which have final *alif* the lengthening letter is omitted from the penultimate, as

بهيا چهيا سهيا اوسها رهسيا کڤلا

(*b*) In derived words the aim should undoubtedly be to bring the spelling into agreement with the pronunciation as far as possible without making an entire revolution in the present system of spelling. As a general rule, the spelling of the root should remain the same as it was before the addition of the prefixes and suffixes. No change of spelling is necessary when the vowel sound of the last syllable of the root is *e*, *i*, *o*, or *u*. This will be made plain by the following three sets of examples:

*b*¹. The final syllable open:

ganti gantikan gantian laku laku-nya lakukan

لاكوكن لاكوڽ لاكو كنتين كنتيكن كنتي

*b*². Final syllable closed and containing a weak letter:

kaseh kaseh-nya kasehi unjok unjokkan unjoki *

انجوكي انجوقكن انجوق كاسيهي كاسيهڽ كاسيه

*b*³. Final syllable closed but without a weak letter:

fikir fikirkan fikiran bunoh bunohkan pembunohan

ڤمبونهن بونهكن بونه فيكران فيكركن فيكر

(*c*) If the last syllable of the root has the open *a* sound, the *alif* must always be written when a suffix is added, even if the root does not require final *alif*, as,

ada ada-lah rasa rasa-nya raja rajakan

راجاكن راج رأساڽ راس اداله اد

(*d*) If the last syllable of the root is closed and has the *a* sound, the addition of a suffix commencing with a consonant produces no change in the spelling of the root, as,

dapat dapatkan susah susahkan susah-nya

سوسهڽ سوسهكن سوسه داڤتكن داڤة

but if the suffix commence with a vowel sound, the *alif* is usually written in the last syllable of the root:

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* *Unjoki* may also be spelt انجوقكي. See page 102, footnote.

dapat	*dapati*	*kras*	*mengrasi*	*senang*	*kesenangan*	*susah*	*kesusahan*
داڤة	داڤاتي	كرس	مڠراسي	سنڠ	كسناڠن	سوسه	كسوساهن

(*e*) When both syllables of the root have the *a* sound, and the addition of a suffix requires in the last syllable an extra *alif*, the Malays invariably omit the *alif* of the first syllable of the root, unless it follows one of the letters د ر or و ; thus,

bacha	*bachakan*	*di-bacha-nya*	*bapa*	*bapa-nya*	*kata*	*katakan*
باچ	بچاكن	دبچاث	باڤ	بڤاث	كات	كتاكن
perkata'an	*karang*	*karangan*	*makan*	*makanan*	*nama*	*namakan*
ڤركتأن	كارڠ	كراڠن	ماكن	مكانن	نام	نماكن
nama'i	*salah*	*kesalahan*	*tanam*	*tanaman*		
نمأي	ساله	كسلاهن	تانم	تنامن		

But with words commencing with د ر or و the spelling is,

dada-nya	*dagangan*	*dalam-nya*	*perdayakan*	*rasa-nya*	*wayangan*
داداث	داكاڠن	دالمث	ڤرداياكن	راساث	واياڠن

With roots in which *ya* is a consonant, the omission of *alif* would cause ambiguity; it should therefore be retained, as,

انياي انياياكن اوڤاي اوڤاياث برنياك ڤرنياكأن بياس بياساث

(*f*) The suffix *an* requires *alif* when the root ends with the letters د ر or و

fikiran	*kedengaran*	*kelakuan*	*petutoran*
فيكران	كدڠران	كلاكوان	ڤتوتران

In such words, the *alif* which would otherwise be required by rule (5) (*d*) in the last syllable of the root must be omitted, as,

بايران كبسران كبنران كدڠران كسوكران

(*g*) The further addition of suffixes or particles to derived words should cause no change in spelling. Some persons write *alif* after the possessive pronoun *nya* when it is followed by the particles *lah*, *kah*, etc., but this appears to be unnecessary. Examples:

bapa-nya	*bapa-nya-kah*	*kasehi*	*di-kasehi-nya-lah*
بڤاڽ	بڤاڽكه	كاسيهي	دكاسيهيڽله

nama'i	*di-nama'i-nya-lah*
ڠأي	دڠأيڽله

(6) The orthographical sign *hamza* ء, which was very seldom written in the manuscripts of the 17th century, is now in common use among the Malays, chiefly for the purpose of introducing a syllable which commences with a vowel; they never employ it however for this purpose at the beginning of a word. The *hamza* is placed over *alif*, *wau* or *ya* according to the vowel sound of the syllable in which it is used.

(*a*) Root words commencing with the vowels corresponding to *wau* and *ya* are written with an initial *alif*, but this *alif* drops out on the addition of the prefix *sa*, its place being taken by the *hamza*; with the prefix *ke* the *alif* is retained and *hamza* written over it.

sa'orang	*sa'olah-olah*	*sa'isi*	*sa'ekor*	*sa'umpama*	*ke'inginan*
سؤرڠ	سؤله٢	سئيسي	سئيكور	سؤمڤام	كأيڠينن

In the following words the *alif* is the lengthening letter of the preceding syllable,

ia'itu	*ka'il*	*ra'eh*	*da'irah*
يأية	كأيل	رائه	دائره

(*b*) In similar derivatives formed from words commencing with the *a* sound, the *alif* is retained and the *hamza* written over it, as,

ke'ada'an	*ke'ampat*	*ka'atas*	*sa'akan-akan*
كأدأن	كأمڤة	كأتس	سأكن٢

Hamza is used in the same way with the suffix *an* following an *alif*, as,

kenyata'an *perkata'an*

ڤركتأن كيتأن

(*c*) *Hamza* is also used with the suffix *i* when it follows an *alif*, but not when it follows *wau*, as,

mula'i *nam'i* *serta'i* *bharui* *ketahui* *lalui* *tunggui*

تڠكوي لالوي كتهوي بهاروي سرتأي نمأي مولأي

(*d*) *Hamza* is sometimes placed at the end of a word instead of final ق to indicate a shortening of the final syllable, as

bêngko' *dato'* *inche'* *ma'* *poko'* *têngo'*

تيڠؤ ڤوكؤ مأ انچئ داتؤ بيڠكؤ

(*e*) It also appears in a few Arabic words:

mala'ikat *aja'ib* *mu'min*

مؤمن عجأيب ملأيكة

IV. For the sake of brevity and clearness the proposed rules for Malay spelling are now recapitulated, without the explanations which were necessary above.

PROPOSED RULES FOR MÂLAY SPELLING.

(1) Final *wau* and *ya* must be used in all words ending in the sounds *u*, *o*, *au*, and *i*, *e*, *ai*, respectively, except

اين ايت يأين يأيت سوات سڤرة

(2) Final *alif* must be used in all words ending in the *a* sound, except (*a*) when the final consonant is ب ج چ ک ڬ ث ; (*b*) when the final consonant is ي ن م ڤ س ت preceded by *alif*, or (*c*) one of the following exceptions:

مول مانسي سرت اڤبيل كارن ڤول ڤد دي اي اد سكل

(3) (*a*) In two-syllable roots having one syllable open and the other closed, the weak letters *wau* and *ya* are to be inserted in the closed syllable having the *e*, *i*, or *o*, *u* sound respectively, except when the sounds of the two syllables are of the same class (*o* and *u*, *o* and *o*, *u* and *u*; or *i* and *e*, *e* and *e*, *i* and *i*). (*b*) When both syllables are closed and have similar sounds, the weak letter must only be used in the second syllable; but (*c*) if the sounds are dissimilar, one being the *a* sound and the other *wau* or *ya*, the *wau* or *ya* must be written in whichever syllable it occurs; and (*d*) if the sound in one syllable is *wau* and the other *ya*, both must be written. (*e*) The following common words are exceptions to this rule, being written without the weak letters,

اوله ڤڠکل تڠکل هابس ڤوته بوله راتس مليا ايسق جمڤا ڤنتو منتا
همڤون ڤنتا چنتا

Three-syllable roots must be treated similarly.

(4) Where a syllable commencing with the *a* sound follows a syllable ending in the letter ر د or و the *alif* must always be written. Examples:

لوار مواة جوا بواه بواة دوا بواڠ

(5) (*a*) In root words, lengthening letters are used in those open syllables on which the accent falls. Several words of Arabic origin, however, are exceptions to this rule, and a few other words, such as,

ملك ڤد سده کڤلا سکل جکلو تتکل مانسي ملينکن کتهوي

(*b*) In derived words, when the vowel sound of the last syllable of the root is *e*, *i*, *o* or *u*, the spelling of the root remains unchanged. (*c*) If the root ends with the open *a* sound, an *alif* must be written in the last syllable of the root when a suffix is added. (*d*) If the last syllable of the root is closed and has the *a* sound, an *alif* is usually written in the last syllable of the root on the addition of a suffix commencing with a vowel sound, but if the suffix commence with a consonant the *alif* is not required, and the spelling of the root remains unchanged.

(*e*) When both syllables of the root have the *a* sound, and the addition of a suffix requires an extra *alif* in the last syllable, then if there is an *alif* in the first syllable of the root it should be omitted, unless it follows one of the letters ر د و or ي

(f) When the root ends with one of the letters ر د و an *alif* must be written before the suffix *an*, the *alif* required by rule (5 d) is then omitted. (*g*) The further addition of suffixes or particles to derived words causes no change in the spelling.

(6) (*a*) When *sa* is prefixed to a root commencing with a vowel sound corresponding to *wau* or *ya*, the *alif* drops out, and *hamza* takes its place; with the prefix *ke* the *alif* is retained and *hamza* is written over it. (*b*) When the root commences with the *a* sound, the *alif* is retained and the *hamza* written over it. *Hamza* is also employed in the same way with the suffix *an* following an *alif*. (*c*) It is used with the suffix *i* following an *alif*, but not when it follows *wau*. (*d*) At the end of a word, *hamza* sometimes takes the place of final ق . (*e*) It also appears in a few Arabic words.

In order to show the application of the principles of Malay spelling reform suggested in this paper, the first chapter of *Hikayat Abdullah*, spelt according to the above rules, is here appended, with a few notes on words which are spelt in an unusual way. A glossary of the words used in this paper as examples is also appended. The root words are arranged in the order of the Malay alphabet, and, wherever necessary, the spelling of one or more derivatives is given after the root. In order to make this list more complete, several words have been inserted in the glossary which will not be found among the examples; these include a number of words in the spelling of which the Malays are very inconsistent, so that it seemed desirable to suggest a fixed standard of spelling in such cases.

It will be seen that this method of spelling is essentially the same as is at present in use among educated Malays throughout the Malay Peninsula, which is admitted, even by the Dutch scholars, to be the home of the purest form of the Malay language.

In this paper but little more has been done than to explain the rationale of this modern Malay spelling, and to reduce it to a system which would enable those who are prepared to adopt it to spell uniformly and consistently with themselves. It has been sought to adhere as closely as possible to the spelling employed by the best educated Malays at the present time in writing their own language, in the firm belief that it is very much more feasible for the few Europeans who use the Malay character to accommodate themselves to the native way of spelling, than for them to attempt to coerce a whole nation of intelligent and self-reliant men into a return to the antiquated Arabian system of orthography illustrated in the manuscripts of the 17th century, which the Malays have been doing their best to improve for hundreds of years past.

APPENDIX A.

بهوا ملك اداله كڤد تتكل هجرة سنة ١٢٤٦ تاهون كڤد ليما ليكور هاري بولن شعبان المكرام يأية كڤد دوا ليكور هاري بولن اقتوبر تاريخ مسيحي سنة 1840 تاهون بهوا ديواس اية اداله سؤرغ صحابتكو يأية اورغ ڤوته يغ كوكاسيهي اكندي ملك اياله ممنتا ساغة٢ كڤداكو يأية هندق مغتهوي اكن اصل اوصلكو دان ڤري حكاية سكل كهيدوڤن ديريكو ملك اي ممنتا كارغكن سوات كتاب دغن بهاس ملايو ملك اداله سبب سكل حال دان ڤركارا يغترسبوة اية منجادي مشغلله اكو سرت برتله راساث اغكوتاكو سبب دودق برفيكركن كهندق ككاسيهكو يغدمكين كارن سكل حال احوال يغترسبوة اية سمواث ڤركارا٢ يغتله لالو زمانث سباكيلاكي يغ منداتغكن دكچيتا دالم هاتيكو سبب بهوا سسغكوهث اكو اين سؤرغ بوده لاكي دغن كورغ بوديكو دان فهمكو دالم علمو بهاس ملك برتمبه٢ ڤول ڤيچق

ڤڠتهوانکو دالم علمو مڠارڠ اداث شهدان لاݢي اداله حالکو اين تمبول تڠݢلم
دالم ڤکرجأن جواتنکو 1 ملک اوله سبب سݢل ڤرکارا يڠترسبوة ايتله
منداتڠکن ڤرچنتأن دالم هاتيکو سباݢيڤول ملک کتاکوتله اکو اکن ديريکو
سبب کودڠر دان کوليهة کچواليث کباپقکن ڤول اورڠيڠ مڠاکو ديريث ڤد
زمان اين ڤندي دان چاکڤث ڤون برلبه٢هن سڤاي دڤرچاي اورڠ اکندي
ڤندي تتاڤي چاکڤ اڠين سهاج ملک اڤبيل دسورهکن اورڠ اکندي بربواة
بارڠسوات ڤکرجأن اتو کراڠن اتو دريحال توليس منوليس ارتي بهاس
نسچاي دداڤاتيله اکنديأية کوسڠ سبب سݢل چاکڤ دان کڤنديث اية بوکن
دڠن ڤلاجران ملينکن منڠر٢ سهاج سڤنجڠ جالن ملک سبب ايتله تياد
برکتهوان هولو هيلرث دانلاݢي ڤول کباپقکن اورڠيڠ ببل يڠتياد برباتو اوجي
دناڠنث اڤبيل اي منڠر چاکڤ اورڠ برباݢي٢ اية يا 2 بوکن اداله کلاکوانث
سڤرة اورڠ مڠنتوٴ دسورڠکن بنتل ملک للڤله سهاج اي يعني ڤرچياله اي
اکندي دڠن تياد دچوباث ياکه اتو تيدق سوٴمڤام سباتڠ بولوه 3 ترديري
ملک ڤد سڠکاٴث اينله سباتڠ کايو يڠ بايک لاݢي لورس تياد بيڠکڠ بيڠکق
ڤستي اد برترس دالمث ملک جکلو کيراث اورڠ يڠ ممڤويأي بودي نسچاي
دبلهڤله دهولو دليهتث دالمث نسچاي دداڤاتيث کوسڠ اداث تتاڤي اداله سڤرة

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1. The spelling of this word *jawatan* is somewhat ambiguous, and the word is sometimes pronounced *juatan* by ignorant persons, but this spelling agrees with Rule (5) (*e*).

2. Many Malays spell the affirmative monosyllable *ya* in the same way as the two-syllable pronoun *ia*. But this spelling seems better.

3. To distinguish *buloh* from *boleh*, it is better to insert the *wau* in the last syllable of this word, through contrary to Rule (3) (*a*).

كات عارف بهواسث جوهاري جوك يڠ مڠنل مأنيكم مك استميوا ڤول ڤد
زمان اين سمنجق سلة تاله منجادي نكري بلالڠ تله منجادي لڠ دان ڤيجة٢ ڤون
تله منجادي كورا٢ دان چاچيڠ ڤون تله منجادي اولر ناك برمول اداڤون
اصلث سكل عجأيب اين تربيتث دري سبب هرتا دنيا اين مك جكلو هينا
دان بوده سكاليڤون اصل اد برهرتا نسچاي اياله ڤندي دان ترمليا مك
جكلو ڤندي دان مليا تتاڤي تياد برهرتا نسچاي ترهينا جوك سبرمول اداله
سكل ڤركتأن دان مثل دان اومڤمأن اية سمواث كوامبيل عبارة باكي ديريكو
ڤرتام٢ هينا كأدأن ديريكو دان كدوا مسكين حال كهيدوڤنكو دان كتيك
كورڠ علمو دان فهمكو دان كأمڤة بوكنث اكو اين اهلي باكي ڤكرجأن كارڠ
مڠارڠ اية مك بهواسث تياداله باكيكو قواة 4 كواس دان داي اوڤاي ملينكن
درڤد الله اداث دان لاكي سكالي٢ تياد سوڤي ديريكو دريحال برصفة ككوراڠن
دان كلماهن ڤد تيڤ٢ ماس دان كتيك اداث كلكين ستله هابسله فيكرانكو
يڠدمكين مك تيبا٢ ترسدرله سأوله٢ دكجوتكن اورڠ اكنداكو درڤد تيدوركو
سمبيل بركات دمكين جكلو كيراث اڠكو هينا ممنتاله ڤد يڠمليا دان جكلو
اڠكو مسكين ڤنتاله ڤد يڠ كاي دان جكلو كورڠ فهممو ڤوهنكنله كڤد
توهن يڠتله برجنجي بارڠسياڤ يڠ ممنتا اي اكن منداڤة مك جكلو كيراث
دمكينله كموراهنث توهن ايت انشأ الله تعالى اكو ممنتا تولڠ جوك دڠن
سبوله٢ث كڤداث يڠ تله ممبنتڠكن لاڠية يڠ سبسر اية دڠن تياد برتوڠكة

---

4. I have spelt this word in the same way as *buat*.

سڤاي دڤنوهيث اکن کهندق ککاسيهکو اية ملك جکلو اکو اين بوکنث اهلي
باڬي يڠدمکين سکالي ڤون بهوا هارڤله جوك اکو کڤداث اکن مپرتأي اکو
اتس ڤکرجأن يڠ سديکة اين اداث

APPENDIX B.

اتور اتوري اتوران	ادو ڤڠادوان
اجر اجري ڤڠاجران	استان استناث
اد اداله کأدأن	اڠکة اڠکاتن (1)

---

1. From the examples given in this glossary (which was completed after the paper was already in print) it would seem possible to make Rule (5)(d) more definite as to whether or not the *alif* should be inserted in a closed final syllable having the *a* sound, on the addition of a suffix commencing with a vowel. It appears that the Malays usually insert the *alif* when the last consonant of the root is ت or ہ but not otherwise, unless the stress in distinctly on that syllable. Thus :

اڠکاتن اوباتي ايڠاتن ايکاتن سوکاتن مليهاتي حرماتي
اوڤاهن بنتاهي نکاهن تمباهن ڤرسمباهن کسوساهن ڤچاهن ڤرنتاهن
کلماهن ملوداهي کموراهن کموداهن

Roots ending in ت and ہ which are exceptions to this rule are :

کڤايهن کساڠتن سورتن کاکهي

The following are examples of roots ending in other consonants, the derivatives being written without *alif* :

کأمسن بالسن تڠکڤن کتڠکلن رمڤسن ڤڠهارڤن

But the following have the accent on the last syllable of the root and take *alif* :

تلاني کديامن ڤساني مڠنالي ککلاڤن مڠکنأڤي کلڤاسن

اڠكونا
اڠين
اڤ اڤاكه
اڤبيل
اڤية
اكام اكماڽ
امبيل
امس كأمسن
امڤة كأمڤة
انتارا
انتوڠ
انجوق انجوقكي (2)
انچي
انق ڤرانقكن
انياي انياياكن
اوبة اوباتي
اوتس اوتسن

اودارا
اوسڠ اوسڠن
اوسها
اوڤاي اوڤاياڽ
اوڤه اوڤاهن
اوكر اوكران
اوله ڤراولهن
اومڤام ڤراومڤمأن سؤمڤام
اومڤة
اونتا
اوندڠ
اي اياله
ايت ايتله
ايريڠ (3)
ايسق كأيسقكن
ايڠة ايڠاتن
ايڠين كأيڠينن

---

2. See footnote p. 102.

3. Three words in this list are almost invariably spelt with the weak letter *ya* in both syllables, contrary to Rule (3)(a):

ايريڠ ايڠين كيريم

ايکة ايکاتن
ايکوة
ايکور سئکور
ايلوق کأيلوقکن
ايام
ايمان
اين اينله
باتوق
باچ بچاکن بچأن
باڠون باڠونن
باڤ بڤاث بڤاڽکه
بالس بألسن
باليک باليقکن
بأو
باوا
باير بايران
بايک ممبايقکي
بايق کبايقکن
بتول ممبتولي

بتينا
بچارا بچاراکن
برة ممبراتي
براڤ براڤکه
برس
برنياک ڤرنياکأن
بدن
بسر کبسران
بڠسا
بڠسو
بݢيتو
بݢيمان بݢيمانکه
بلا
بلاڠا
بلنجا
بلوم
بلي ڤمبلين
بناس بنساله
بنته بنتاهي ڤربنتاهن

بنتيڠ
بچان بچناڽ
بنر كبنران
بندا
بواة ڤربواتن
بواه بواه٢هن (4)
بوتا
بوده كبودهن
بوڠا بوڠا٢ئن
بوڠكر
بوك بوكأي بوكاكن
بوله بولهله
بونه ڤمبونهن
بوهڠ

بهاس بهساڽ (5)
بهكيا
بهوا
بهيا
بياس بياساڽ
بيبس كبيبسن
بيسا
بيڠكؤ
بيلا
بيلڠ بيلاڠن بيلڠكن
بيدأ
بيمبڠ
بينتڠ
تاروه ڤتاروهن
تاريك

---

4. In reduplications with the suffix *an*, the last consonant of the root is repeated in the suffix, and if the root ends with *alif* a hamza is written with the suffix.

5. This word is sometimes spelt بهاسڽ or بهاساڽ but this spelling, which is in accordance with Rule (5)(e), seems perfectly legible.

تاڠن تاڠني دتاڠنيڽ (6)
تاڠيس
تاكوة تاكوتي كتاكوتن
تانم تنامن
تاون تاوانن
تاهن تاهني (6)
تاهو كتهوي ڤڠتهوان
تاهون
تاڽ تڽاكن تڽأي
تختا
ترا
ترڠ كتراڠن منراڠي
تروس
تريق *trek* *triak*
تريا
تڠكڤ تڠكڤن
تڠكل كتڠكلن

تڠكوڠ
تڠكول
تڠكوه
تڠكي
تكون
تكه تكاهن
تلن تلاني
تلور
تلوق
تليڠا
تمبول
تمبوه
تمبه تمباهن تمباهي
تنتوة
تنجوڠ
تندوق
تنديه

---

6. According to Rule (5)(e) these words should be تڠاني and تهاني and they are occasionally so spelt, but the Malays seem to find some difficulty in reading these words if they are spelt in that way.

تواڠ تواڠي
توان
توتر ڤتوتران
توتڤ توتڤن
تورن توروني كتورنن (7)
توڠكة
توڠكڠ
توڠكل
توكر توكران
تولڠ ڤرتولڠن
تولس
توليس
تومڤه
توندا
تيتق
تيدور
تيڠؤ تيڠقله
تيمڠ تيمباڠن
تيمب
تيمڤا
تيمور
جادي كجادين
جاك جكاله
جالا
جالن جلاني ڤرجلانن
جاؤه
جاهة كجهاتن
جكلو
جمڤا
جوا
جواب
جوال
جوك
جيك (8)

---

7. This spelling of *turuni* does not follow Rule (3)(a), but تورني is not easily read, and as the accent is *turúni* it seems better to insert the *wau*.

8. This word is often spelt جك

چاري ڤنچارين
چلاک چلاکاث (9)
چنتا
چنتيک
چندان
چوب دچوباث چوبأي
چوچو
چوما
چيتا
چينا
حال
حرمة حرماني
حکم حکمن
حکيم
حيران
خبر خبران
خلاصي
خواطر
داڠ منداڠي کداڠن (10)
داتؤ
دادا
داڤة دداڤاتي کداڤاتن
داکيڠ داکاڠن
دأون
داي داياث
دأيره
درس
درڤد درڤداث
درهاک درهکاله
درجال
دسنا
دسيتو
دڠر کدڠران
دڤا

---

9. The form چلکاث which would be in accordance with Rule (5) (e), is unusual and not easily read.

10. See Note (6).

دكچيتا
دمکين
دندا
دنديڠ
دنهاري
دنيا
دوا
دوري دورين
دودق كدودقكن مندودقكي
دوسا
دوسن
دوك دكچيتا
دهاكث دهكاث
دي دياله
ديم كديامن منديامي
ديواس
راب
رات راتاكن
راتڤ مراتڤي

راج راجاكن كراجأن
راس راسأي
راكث راكاث
رأيه
ربان
رڠکية
رمڤس رمڤسن
رمڤوة
رنتوه
رندو
روسا
روسق كروسقكن
روڤا
ساڠة كساڠتن (11)
سأكن٢
ساكية
ساله كسلاهن
سام سماث
سان دسانله

---

11. See Note (1).

ساأوه
ساوه
ساهوة
سبدا
سبوة
سرب
سرت سرتأي بسرت
سده کسداهن سدهکن
مڽودهکن (12)
سديا
سديکة
سڠاج سڠجاڽ
سڠکور
سڠݢوه
سڤاروه
سڤاي
سڤرة سڤرتيڽ
سقسا

سکارڠ
سکچيتا
سکلين
سݢرا
سݢل
سلڠ کسلاڠن
سلوار
سلا
سليسه ڤرسليسهن
سمبليه ڤرسمبليهن
سمبه ڤرسمباهن
سمبيل
سمڤرنا
سموا
سنتوسا
سنجات سنجتاڽ
سنجاکالا
سنڠ کسناڠن

---

12. The spelling of the root is irregular, and wherever possible the derivatives are spelt in the same way as the root.

سوات
سوارا
سواڤ
سورة سورتن (13)
سورڠ
سٔورڠ
سوروة
سوره سورهن
سودارا
سوداكر
سوسن
سوسه كسوساهن
سوك كسوكأن سچيتا
سوكة سوكاتن
سوكر كسوكران
سٔوله٢
سومڤه
سهيا

سياڤ سياڤكه
سيسا
سيڠ
سيڠا
سيمڤن
شك
شكور
عجأيب
عمر
فيكر فيكران
ڤاكي ڤكاين
ڤابوڠ
ڤايه كڤايهن (14)
ڤچه ڤچاهن
ڤراهو
ڤرچاي كڤرچيأن
ڤرڠ ڤڤراڠن ممراڠي
ڤركارا

---

13. This is the usual spelling.
14. See Note (1).

ڤرقسا
ڤرلاهن٢
ڤرمڤوان
ڤرنته ڤرنتاهن
ڤد ڤداڽ
ڤديه
ڤسن ڤساني
ڤڠكل ڤڠكيلن
ڤقسا
ڤكڠ ڤكاڠن
ڤليتا
ڤليهارا ڤليهاراكن
ڤنة
ڤنتا
ڤنتو
ڤندڠ ڤمنداڠن
ڤنوه ڤنوهي
ڤواس ڤواساله *puasa*
ڤواس ڤواسله *puas*

ڤوتر ڤوتران
ڤوتس كڤوتسن
ڤوته
ڤوكل ڤوكلن
ڤوكؤ
ڤول
ڤوله
ڤوڽ ممڤوڽأي
ڤها
ڤيله ڤيلهن
قواة ككواتن
قوم
كات كتاكن ڤركتأن
كأتس
كارڠ كراڠن
كارن
كاسوة
كالا
كأمڤة

كاون كاونڽ
كاي ككيأن (15)
كأية
كأيل
كتاب
كچيل
كرا
كرج ڤكرجأن
كرس مڠراسي
كرنيا
كريتا
كريس
كريڠ
كستا
كڤل
كڤلا
كڤيڠ
كلاڤ

كلكين
كلوار
كلوركڽ كلوركاڽ
كمبيڠ
كمدين
كمڤوڠ
كنا مڠنأي
كنل مڠنالي
كواس كواساڽ
كوالا
كوتا
كوتر
كورڠ ككوراڠن
كودا
كولية
كومبڠ
كيت كيتاله
كية

---

15. By Rule (5)(e) this should be ككايأن but the word is always spelt as it is here given.

كبريم كبريمن
كادوه
كاكه كاكهي (16)
كلر كلران
كلڤ ككلاڤن
كمر ككمران
كنتوڠ
كنتي كنتين
كنڤ مڠكناڤي
كونا
كونتيڠ
كيلا
لارڠ لاراڠن
لادا
لاكو كلاكوان
لاڤر كلاڤران
لام لماث
لأوة لأوتن
لاون لاوانن
لابر ڤلابران
لأين ملينكن
لاين لاياني
لبه كلبيهن
لڤس كلڤاسن
لڤسا
لمه كلماهن
لنتيق
لوار
لواس
لوده ملوداهي
لوسا
لوكث لوكاث
لوڤا
ليما
ليمڤر مليمڤري
ليهة مليهاتي
مأ
مات متاث

---

16. See Note (1).

ماتي كماتين
ماس مساڽ
ماسوق ماسوقكي
ماسيڠ
ماكن مكانن
مان مانله
مانسي
مانيكم
مأين ڤرمأينن
متهاري
مريك
مريكئت
مسكين
مڠاڤ مڠاڤكه
مك
ملائكة
مليا
ملينكن
ممڤي

منتا
مواة
موره كموراهن
موده كموداهن
موك موكاڽ
مول مولاڽ
مؤمن
مينوم
نام نماڽ
نايك نايقكي
نجيس
وايڠ واياڠن
ورتا
ورنا
وقتو
هابس ڤڠهابسن
هارڤ ڤڠهارڤن
هادڤ هداڤن
هاڽ هڽاله

هرنا
هستا
هيڠك
همب همباڽ
همڤون ڤرهمڤونن
همڤير همڤيري
هنچور
هندق كهندقكي
هيجا
هرك هركاڽ

هيدوڠ
هيدوڤ
هيلا
هيلڠ كهيلاڠن
هينا
يا
يأيت
ۑات ۑتاڽ
ۑالا
ۑاموق

Short Notes.

ON THE OCCURRENCE OF MUS. SURIFER, G. S. MILLER, IN PERAK.

In the Proceedings of the Biological Society of Washington, vol. xiii, April 21, 1900, Mr. Gerrit S. Miller, of the U. S. National Museum, describes no less than seven new species of Rats collected in 1899 by Dr. W. L. Abbott in the mountains of Trong, a small Siamese State on the west side of the Peninsula, about 500 miles north of Singapore.

This paper should not be overlooked by students of the smaller Malayan mammals, and Mr. Miller would probably kindly supply any one interested in the subject with a copy on application. The new rats described are *Mus vociferans*, *M. ferreocanus*, *M. validus*, *M. cremoriventer*, *M. asper*, *M. pellax*, and *M. surifer*. I am able to record the last of these new species from the Larut Hills, Perak, and it is probable that at least some of the others follow the main range down the Peninsula. *Mus. surifer* was obtained by Dr. Abbott in February 1899. I first met with it in February 1898, catching a single example in a steel trap near the Hut, Maxwell's Hill. Unfortunately the hinder portion of the specimen had been eaten by some small carnivorous creature, and, after noting its appearance I threw it away. Last year on revisiting the hills I remembered this rat and succeeded in trapping a specimen alive. It was a charmingly pretty and fearless little creature, quite tame from the time of capture, and I was overruled by feminine influence into keeping it alive, with the result that it escaped eventually in Kwala Lumpur! At the same time I got a very damaged specimen from same coolies, and sent it in spirit to Mr. Oldfield Thomas, who identified it as the newly described *M. surifer*.

Mr. Miller's paper above referred to is a good example of the exceedingly thorough and careful work of the new school of American mammalogists.

A. L. BUTLER, F. Z. S.
4th July, 1901 Khartoum, Soudan.

RAMBONG BEETLE.

From two localities in Selangor specimens of a common longicorn beetle *Batocera octomaculata* and its grub have been sent, as serious pests destroying the India-rubber tree, Rambong, *Ficus elastica.* The grub over two inches long bores up the stem of the tree, while the beetle itself gnaws the bark, bites off the buds and then proceeds to demolish the leaves, eating them quite voraciously. The grub is when full grown about two inches and a half long and a quarter of an inch wide, flattened soft and white except for its hard brown chitinous head and the upper surface of the first two segments. Like all longicorn grubs it has no feet. It makes the usual tunnels elliptic in section through the length of the larger boughs and trunk of the tree, and also attacks in the same way *Ficus indica* and the Waringin, *F. Benjamina*, and probably others of our wild figs. It pupates in the tube it has made, and eventually hatches out into a handsome large beetle, one and a half to two inches long, without the antennae. The head is brown, with large eyes and powerful jaws. The antennae, fairly stout, longer than the body, dark brown, and rough with short processes in the lower surface. The thorax, short and broad with a conic thorn on each side, is dark brown with two red crescents in the centre. The elytra three quarters to an inch and a quarter long, oblong, blunt, broadest at the shoulder, dark brown with black shining raised dots in the upper part near the shoulder, smooth below. There are four pair of white spots on the elytra, the uppermost pair small and round, the next larger and more or less oblong sometimes with an extra white spot near the upper edge, the next pair nearly as large, the lowest pair much smaller. The form and size of the spots vary, but appear to be always eight. The scutellum is also white. The under surface of the body is light brown and a broad white stripe runs on each side, from behind the eye to the tail. The legs are powerful, over an inch long, and brown. The beetle feeds during the day, and also moves about at night. It is attracted by light and often flies into the house after dark. Like most longicorn beetles it squeaks loudly when caught and it can also bite severely. The amount of injury a beetle of this kind could do in a plantation of large sized trees would be very great. Fortunately it is easily caught and very conspicuous, and by abolishing all unnecessary fig trees from the neighbourhood of a plantation and carefully attending to the young plants, the pest out to be easily kept in check.

H. N. R.

In Memoriam

ALLAN MACLEAN SKINNER, C. M. G.

The death of Mr. Skinner will be deeply regretted by all who knew him, and as one of the original members of the Society it is fitting that some special notice of the loss the Society has sustained by his death should appear in the Journal. At the preliminary meeting held on 4th November 1877, it was Mr. Skinner who proposed that the gentlemen present should form themselves into a Society to promote the collection and record of information relating to the Straits Settlements and neighbouring countries. Of those present at the first meeting the majority have died and the Bishop of Singapore and Sarawak, the first President, is the only one still resident in the East.

At a meeting held in February 1878, was exhibited a skeleton map of the Malay Peninsula showing how little was then known of the Native States. Under the personal direction of Mr. Skinner the blank spaces were partially filled in and the first map of the Peninsula was published by the Society.

In the first number of the Journal is a valuable paper by Mr. Skinner on the Geography of the Peninsula, with maps.

In 1883 Mr. Skinner was Vice President and in the Journal published in December 1882, appeared his 'Outline History of the British Connection with Malaya,' a most useful compilation which is reproduced in the Singapore and Straits Directory.

Among his other contributions may be mentioned papers on 'The Java System' and 'Straits Meteorology'. In 1885 Mr. Skinner was elected President. He received the cordial thanks of the Government for the valuable results of the action of the Society with regard to the publication of 'Eastern Geography,' which he edited.

In 1888 he was again elected President, but from the time of his transfer to Penang in the following year as Resident Councillor, he ceased to take an active part in the work of the Society. Since his retirement in 1897 Mr. Skinner was engaged in writing a History of the Straits Settlements.

C. W. S. K.

Singapore, 17th August, 1901.

Temple

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